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**Level III Site Inspection  
for  
Hoffman Landfill  
  
Allegany County, Maryland  
  
(MD-4)**

**Volume I**

**December 1992**

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## **1.0 Introduction**

### **1.1 Authorization**

The Maryland Department of the Environment, Hazardous and Solid Waste Management Administration (MDE/HSWMA) performed this study under U. S. Environmental Protection Agency (USEPA) Cooperative Agreement #V-003577-01-0.

### **1.2 Scope of Work**

The MDE/HSWMA was contracted to perform a Level III Site Inspection of the Hoffman Landfill (MD-04). The potential for the release of hazardous waste from the site by the way of groundwater, surface water, soil exposure and air is evaluated. The populations and sensitive environments which may be impacted are then discussed.

### **1.3 Executive Summary and Conclusions**

The Hoffman landfill is a 22 acre landfill located near Frostburg in Allegany County, Maryland. Originally, this area served as a coal strip mine. As a demonstration project to show the effectiveness of strip mines as landfills, this abandoned coal strip mine was converted into a sanitary landfill in 1967. The site accepted approximately 225,000 tons of municipal waste from April 1967 through 1971. In addition to the municipal waste, the following companies disposed of waste at this facility: Allegany County, Hercules Corp., Celanese Corp., Kelly Springfield Tire and PPG Industries, all centered in Cumberland.

Monitoring of the facility in part was carried out by the Maryland Department of Health prior to the opening of the facility and continuing through 1971. Samples were collected from Braddock Run and the on-site pond. The results gave no evidence of degradation of the stream as a result of leachate from the landfill. The results from the on-site pond indicated that the iron content, chlorides, and total solids in the pond had increased during the landfill's operation. In addition, observation wells were installed on-site, and the results from these samplings indicated that there was no degradation of the groundwater as a result of the landfill operation.

The landfill is located in the Frostburg Industrial Park. Six buildings are located within 200 feet of the site. They are the Frostburg Heights apartment building and an associated nursing home, Rish Equipment, a small bank and two small buildings as part of a Comfort Inn hotel. Two of the buildings; the hotel and the apartment building, may partially overlie the fill area.

In addition, to Hoffman landfill, two other landfills, Vale Summit, and Cabin Run, are also located in the same area. Vale Summit is approximately 1.25 miles southwest of Hoffman, and Cabin Run is approximately 2.25 miles southwest of Hoffman.

MDE/HSWMA CERCLA Pre-Remedial Division collected samples from this site on

June 23, 1992. This sampling included the collection of one residential well sample, one municipal well sample, one monitoring well sample and a non-drinking water well, three off site and one on-site surface water and sediment samples, six on-site and one off-site soil samples and one leachate sample.

The results showed that the on-site monitoring well contained vinyl chloride at 2 ppb. The inorganics of primary concern for the groundwater are barium and beryllium which were detected in a residential well east of this site.

No organic contamination was detected in the surface water samples. All of the surface water samples contained inorganic contamination exceeding three times background concentrations. The sample which contained the lead was collected at the probable point of entry (ppe) for on-site groundwater to surface water. Since lead was detected in the on-site monitoring well and at this point, it was considered an observed release.

Various PAHs were detected in the sediment sample collected from Braddock Run. No inorganics which fit the requirement for an observed release were detected in the sediment samples.

The soil sampling results showed very low concentrations of fluoranthene and mercury in the on-site samples.

## 2.0 Site Description

The Hoffman Landfill was designed as an experimental landfill to test the efficiency of using strip mines as sanitary landfills. The Hoffman Landfill covers an area of 22 acres, and is located on the southeast edge of the city of Frostburg, in Allegany County, Maryland (Figure 1). It is adjacent to, and partly underlies, the Frostburg Industrial Park. The site is accessible through the industrial park, which is located on Route 36 (Figure 2 & 3).

Hoffman Landfill is approximately 3 hours from Baltimore and can be reached by taking Interstate 70 west to Interstate 68 west to State Highway 36. The site is located on the Frostburg, Maryland topographic quadrangle, and the international coordinates of the site are 39°38'30" north latitude by 78°54'30" west longitude.<sup>1</sup> The Maryland Grid Coordinates are 665,333 north by 263,278 east.

The area surrounding the site is rural and commercial, with residential areas nearby in Frostburg and Eckhart Mines. The bulk of the site is empty grassland which is located between the buildings of the industrial park. The exact limits of the landfill are not apparent on the surface, and are not entirely agreed upon in file reports. Figure 3 shows the approximate outline of the landfill and surrounding buildings.

Six buildings are located within 200 feet of the site. They are the Frostburg Heights apartment building and an associated nursing home, Rish Equipment, a small bank and two small buildings as part of a Comfort Inn hotel. Two of the buildings; the hotel and the apartment building, may partially overlie the fill area, but engineering studies associated with the apartment building concluded that the actual fill area was 30 to 50 feet to the east. The road to the industrial park also partly covers the site. Beall High School is located 0.7 miles northwest of the site, and the topographic map of the area shows at least three other schools in central Frostburg, 1.5 miles northwest.

The landfill is approximately 1900 feet long, 50 feet wide at the bottom and 110 feet wide at the top. The depth of the landfill ranges from 30-50 feet. The total volume of the pit is over a quarter of a million yd<sup>3</sup>. The two problems which needed to be addressed before this area could be considered as a potential landfill site were:

- 1) finding a location that offered sufficient cover material
- 2) ensuring that a sufficient liner existed in the landfill to prevent groundwater contamination.

First, it was determined that the adjacent spoil earth, which is the overburden and reject coal, was sufficient cover. In addition, adequate cover material was also available from the sides of the original mine walls. It was discovered that the spoil material breaks down under the weight of earth-moving equipment. The breakdown products include a mixture of small grained sand, silt, and clay which is suitable for cover material.

Once it was found that there was sufficient cover material, the next step was to ensure that an appropriate liner existed in the old excavation pit. It was found that the coal seam rested on solid rock which was determined to be relatively impervious since water from recent rains was still standing in the pit. In addition, to the rock stratum, a three foot layer of the spoil material mentioned above, was compacted to cover these rock (Appendix II)<sup>5</sup>.

In addition, to Hoffman Landfill, two other landfills, Vale Summit, and Cabin Run, are also located in the same area. Vale Summit is approximately 1.25 miles southwest of Hoffman, and Cabin Run is approximately 2.25 miles southwest of Hoffman (see enclosed topographic map).

There are no potable wells on the site although there are monitoring wells, some of which seem to have been paved over.

The topography is very hilly with elevations ranging from 1300-2240 feet (Figure 4). The site is at an elevation of 2050 feet. A pond is located 50 feet south east of the site.

## 2.1 Site Use

Coal was first discovered in the Georges Creek Basin in 1782, and the area became the principle coal producing basin for Maryland.<sup>15,17</sup> The topographic map of the area indicates that extensive strip mining as well as underground mining has occurred in the area.<sup>14</sup>

The site itself is an abandoned coal strip mine (dates of operation unknown) which was converted to a sanitary landfill in 1967. The strip mine was about 1900 feet long, 110 feet wide at one end and 50 feet wide at the other, and was 50 feet deep. The coal bed mined is unknown, but was presumed to be Lower Sewickley (also known as Tyson) coal, which is about 2 feet thick at the site.<sup>5</sup>

The site was originally owned by the Pittsburgh Consolidation Coal Company. In 1963 Maryland Coal and Realty bought the land. As of this Site Inspection, Maryland Coal and Realty are the owners of the site, but have changed their name to Allegany Coal and Land Company.<sup>9</sup>

The landfill demonstration project was partially financed by the U.S. Public Health Service to the Maryland Department of Health in order to show the effectiveness of using abandoned strip mines as landfills.<sup>5</sup> The landfill operated from 1967 to late 1971. Because of the experimental nature of the landfill, many precautions and monitoring systems were in place throughout the operation of the landfill. These precautions included: 1) laying a three foot bed of compacted earth (from spoil piles) at the base of the landfill to slow infiltration of leachate into groundwater 2) installation of thirteen monitoring wells (three on the waste pile and ten just to the west) to constantly evaluate groundwater levels and quality. 3) a boron tracer substance was deposited with the waste in the landfill to help trace the origin of any

contamination back to the site.

The following companies disposed of waste at the Hoffman facility: Allegany County, Hercules Corp., Celanese Corp., Kelly Springfield Tire and PPS Industries, all centered in Cumberland. The waste disposed of included municipal waste, garbage, refuse, and sewage sludge. On average, 235 tons/day was deposited into the fill. From 1967 to 1971 it is estimated that approximately 225,000 tons of refuse was deposited at the Hoffman facility.

## **2.2 Permits and Regulatory Actions**

The Landfill was operated by Allegany County and the Maryland State Department of Health monitored the site for degradation of surface water and groundwater.

## **2.3 Remedial Actions**

There has been no known remedial action to date.

### 3.0 Environmental Setting

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**Table 3A:**

Distance of Ring from the Site	Persons served by Private Wells	Persons served by Municipal Wells	Total Population Served
0 - 1/4	0	0	0
1/4-1/2	49	0	49
1/2- 1	88	450	538
1 - 2	260	28	288
2 - 3	336	1435	1771
3 - 4	538	1074	1612
<b>TOTAL</b>	<b>1271</b>	<b>2987</b>	<b>4258</b>

In addition, the following surface water intakes are not located along the 15-mile surface water pathway, but served populations within four miles of the site: Midlothian (104 people), Carlos Shaft (423 people), and Klondike (345 people).

Well-log printouts from Maryland Department of the Environment's Residential Sanitation Department indicated that 49 people are served by private wells within 1/4 to 1/2 mile of the site. During the site visit, the nearest accessible well was located 0.70 miles east of the site and was drilled to a total depth of 372 feet. The nearest permanent residents are located in an apartment complex and a nursing home which either border the landfill or are on the landfill. Both of these facilities obtain their water from the Frostburg Municipal System.

There are no surface water intakes located along the 15-mile surface water pathway. In addition, there are no designated wellhead protection areas within the vicinity of the site.

### 3.2 Surface Water

The site is in the Georges Creek Valley, a seven mile wide, northeast trending valley between the high ridges of Big Savage Mt. to the northwest and Dans Mt. to the southeast. The valley itself is very hilly, with elevations ranging from 1300 feet to 2240 feet (the site is at 2050 feet). The ridges of Big Savage Mt. and Dans Mt. are at 2900 feet and 2800 feet, respectively. The site is on the eastern side of a small hill which slopes 10-15 degrees down to the east and southeast.

The former landfill is located on the crest of a divide between the northern and southern branches of Braddock Run. A pond is located 50 feet southeast of the site. Surface water runoff from the landfill follows the topography and flows east. The surface water runoff enters into Braddock Run just south of Clarysville approximately 1/2 mile southeast of the landfill. This point constitutes the probable point of entry (ppe) for runoff from the site (Figure 6).

Braddock Run is estimated to flow at 10 - 100 cubic feet per second (cfs). It flows east for approximately 8 miles from the ppe, and during this time it is joined by several small tributaries until it converges with Wills Creek. Wills Creek flows south for 2.5 miles at approximately 324 cfs until it converges with the C&O Canal, a national historic site and sensitive environment. The C & O Canal, a national historic site, makes up about 1.5 miles of the 15 mile surface water pathway. The C & O Canal feeds into the North Branch of the Potomac River. The Potomac River makes up the last 3 miles of the 15 mile surface water pathway. A downstream gaging station estimated the average flow rate of the Potomac to be 1256 cfs.<sup>10</sup> There are no downstream surface water intakes within 15 miles of the site.

The southern branch of Braddock Run is not designated as a wetland.<sup>14</sup> East of Clarysville there are several small areas of forested palustrine wetlands until the convergence with Wills Creek. Each of these wetland areas are approximately 1/2 mile in length. There is also a small area of forested palustrine wetland within the C & O Canal. A final area of wetland exists on the north branch of the Potomac River. Each of these wetland areas also measures 1/2 mile in length. The total wetland frontages associated with this surface water pathway are summarized below:

**Table 3B:**

From	To	Distance	flow rate (cfs)	Wetland frontage
ppe (Braddock Run)	Wills Creek	8 miles	10-100	2 miles
Wills Creek	C&O Canal	2.5 miles	324 <sup>10</sup>	0 miles
C & O Canal	North Branch of Potomac River	1.5 miles	100-1000	0.5 miles
Potomac River	15-mile point	3 miles	1256 <sup>10</sup>	0.5 miles

The Potomac River stretch below the landfill is used for recreational fishing. Braddock Run was barren of fish for many years due to acid mine drainage from the Hoffman Drainage Tunnel, but brook trout have recently returned to the stream.<sup>6</sup> Photographs taken during this site inspection indicate that the water at the confluence of the Hoffman Drainage Tunnel and Braddock Run is too shallow to support a fishery (see photographs, section 8.0).

Several parks and wildlife areas are located within four miles of the site, including the Savage River State Forest, Dans Mt. State Park, and the Dans Mt. Wildlife Management Area.

### 3.3 Soils

The soils at the site have been disrupted by strip mining and covering of the waste on the landfill. Prior to the strip mining operations at the site, the soil consisted of the Gilpin, Westmoreland, and Opequon Series. These are mostly shallow soils. The Opequon and

Gilpin Series soils often have boulders at the surface. All of these soil types have water tables greater than 4 feet, and have infiltration rates of 0.6 to 2.0 inches per hour.<sup>18</sup>

### 3.4 Geology

The landfill is located in the Appalachian Plateau physiographic province. This plateau extends from Alabama to Pennsylvania. It is bordered on the east by the Valley and Ridge physiographic province and on the west it grades into the flat lying rocks of the stable craton. Porosity and permeability of the rocks of the Appalachian Plateau depend on the frequency, density and interconnection of fractures. In general, the most productive aquifers are in sandstone, although yield may vary throughout the formation depending on degree and type of fracturing and cementation. Except on a local level, limestone is not an important source of groundwater in this Province, because it is thinly bedded in most places and often contains shale.<sup>19</sup>

Outcropping at the site is from Permian age undifferentiated rocks and the Monongahela Formation (see Figure 5). The Permian age rocks are present only as a cap on a hill adjacent to the site. The Monongahela Formation consists of interbedded sandstone, siltstone, shale, and several important coal beds,<sup>20</sup> including the Pittsburgh Coal, which is the thickest coal bed in the northern Appalachian coal fields.<sup>21</sup> The formation is from 240 to 270 feet thick in this area.<sup>20</sup>

The Conemaugh Formation outcrops about 0.5 mile east of the site (see Figure 5). It consists of interbedded sandstone, siltstone and shale with minor limestone and coal beds. Thickness of the formation ranges from 835 to 925 feet.

The site is located on the southeast flank of the broad Georges Creek Syncline. The Syncline plunges to the southwest, with rocks striking northeast and dipping 5 degrees to the northwest.<sup>21</sup> No faults are indicated in the area of the site. No karst terrain is present within a 4 mile radius of the site, even though thin limestone beds are known to be present within the Conemaugh and Monongahela Formations.

### 3.5 Groundwater

The landfill is located in the Georges Creek Basin water province, which is coincident with the topographic Georges Creek Valley. The Monongahela Formation outcrops at the site. It yields groundwater to wells and springs in quantities generally sufficient for domestic and farm use. Because of its thinness and isolated topographic position in some places, it is not as good an aquifer as the underlying Conemaugh Formation. Depths of drilled wells in this formation range from 60 to 85 feet. The yield is from 2 to 20 gallons per minute (gpm). Because of mining and tunneling, the Monongahela Formation may be totally drained in some places.

Groundwater from wells and springs in the Conemaugh Formation, which underlies the site, is used for public water supply in various towns in Allegany County. In the target area, the towns of Clarysville and Vale Summit use springs for municipal water supply. Most of the wells in the Georges Creek Basin Water province are in the Conemaugh Formation. Depths of wells present in this formation ranges from 22 to 1354 feet. Yields range from 1 to 170 gpm.

At the site, groundwater exists at a depth of 5 feet. Wells within 1 mile average a flow of 8.5 gpm and range in depth from 50-575 feet and average 164 feet deep. It is believed that surface water runoff and shallow groundwater flows towards the east, while the deeper groundwater flows west towards George's Creek Basin. The site is near the outlet of the Hoffman Drainage Tunnel, which may have affected groundwater location or movement at the site.

Ten observation well were drilled on-site in May of 1970. The wells range in depth from 51-86 feet and were drilled to the top of the Tyson coal seam. Wells number 1-8 were drilled near the landfill pit, and wells 9 and 10 were drilled to observe groundwater levels and indicate any movement from the pit (Appendix III).

Springs are common in Allegany County, usually issuing from limestones and dolostones, but also coming from the Conemaugh and Monongahela Formations. Springs in the Conemaugh Formation range in discharge from 1 to 150 gpd.<sup>20</sup>

### 3.6 Meteorology

The climate of western Maryland is temperate and humid. Average annual precipitation is 40 inches, and the average lake evaporation is 32 inches. The two-year twenty four-hour rainfall is 2.7 inches.<sup>7</sup>

### 3.7 Nearby Land Use and Population Distribution

The total population living within four miles of the site is estimated to be 16,837 persons.<sup>1,13</sup> This population includes the nearby residents plus those attending Frostburg University. According to the topographic maps of the area, approximately 6672 homes are located within 4 miles of the site. This distribution is listed below.

Table 3C:

Distance of Ring from the Site (miles)	Residential Population in the Ring
0 - 1/4	290
1/4 - 1/2	68
1/2 - 1	1112
1 - 2	2172

2 - 3	1519
3 - 4	1511
Total Population:	6672

This estimate is based on topographic mapping of the site area.<sup>1</sup> The number of dwellings within each distance ring were counted, and these values were multiplied by the average of 2.3 persons per dwelling for Allegany County. However, these population values were based upon the latest topographic maps available, which were dated 1971 - 1979. In order to account for the increase in the population of Allegany since that time, the population values were then multiplied by the ratio of the population of Allegany County in the 1990 census to that of the 1970 census.<sup>13</sup> In addition, the topographic maps did not include the nursing home or apartment building which were built within 200 feet of the site in the last decade. A phone call to the managers of each of these buildings produced a rough estimate of the number of residents within 1/4 mile of the site.

The topographic map does not delineate houses in urban areas. As a result, the 1990 Census data were used which showed that approximately 8075 persons permanently reside in the city of Frostburg. In addition, the Frostburg University houses approximately 4100 individuals. Since Frostburg is a secluded University, it was estimated that approximately half of the students which attend this University were included in the population count for the City of Frostburg. Therefore, our total population is distributed as follows:

**Table 3D:**

Source	Population Value	Distance ring in which the population is located
Topographic map Count	6672	See above table which outlines distribution for this population
Census data for the City of Frostburg <sup>27</sup>	8075	1-2 mile ring: 6056 persons 2-3 mile ring: 2019 persons
Frostburg University students not included in the population for Frostburg	2000	Total University population is located within a 1-2 mile radius of the site
<b>TOTAL</b>	<b>16,847</b>	

This site is located in a rural and commercial area. The site is empty grassland between the buildings of the industrial park. Six buildings are located within 200 feet of the site. Of these 6 buildings, two house individuals on a relatively permanent basis: the Frostburg Heights apartment which houses 120 persons, the associated nursing home with approximately 170 residents respectively. In addition, the remaining four buildings include two building which make up the Comfort Inn, a small bank, and Rish Equipment.

Two of these six buildings, the hotel and the apartment building, may partially overlie

the fill area, although an engineering study of the site places the fill area 30 - 50 feet to the east. Beall High School is located 0.7 miles northwest of the site, and the topographic map of the area shows at least three other schools in central Frostburg, 1.5 miles northwest.

Within four miles of the site there is a small area (1/4 - 1/2 miles in length) designated as forested Palustrine Wetland.<sup>11</sup> In addition, an intermittent pond is located 50 feet southeast of the site. This pond receives run-off, leachate and/or shallow ground water from the site and is probably used by local small animals.

#### 4.0 Waste Description

The wastes at this site are associated with the landfill operation which took place from 1967 to late 1971. The wastes were disposed in a pit left by an abandoned coal strip mine.<sup>5</sup>

The waste disposed consisted of municipal waste, garbage, refuse and sewage sludge. It was estimated that approximately 225,000 tons of refuse was disposed at this facility between 1967 and 1971 (Figure 7)<sup>5</sup> During the operational period at the site, the quantity of waste continually increased. In 1967 it was estimated that between 20-60 tons/day was deposited and in 1971 this quantity increased to between 200-275 tons/day (Figure 7). The rules of operation at the Hoffman facility indicated that no hazardous waste could be accepted (Appendix I).

The following companies are known to have disposed of waste at the Hoffman facility: Allegany County, Hercules Corp., Celanese Corp., Kelly Springfield Tire and PPS Industries, all centered in Cumberland.<sup>6</sup>

## 5.0 Site Sampling

### 5.1 Previous Studies

Chemical analysis was completed by the Maryland Department of Health prior to the opening of the facility and continued through 1971. Samples were collected from Braddock Run and the on-site pond. These samples were analyzed for the following parameters: iron, chloride, nitrate, total solids, hardness, and pH. The results gave no evidence of degradation of Braddock Run as a result of leachate from the landfill (see Table 5A below). The authors noted that dilution as possible contaminants enter Braddock Run may affect the results and therefore make degradation of Braddock Run as a result of the landfill harder to detect.

The results from the on-site pond indicated that the iron content of the water had increased, chlorides had increased approximately 30 times, and total solids had also increased (see Table 5B below).<sup>16</sup>

Table 5A: Results from Maryland Department of Health's sampling of Braddock Run.<sup>16</sup>

Constituent or property	Sample collected 1-15-68 (mg/l except pH)	Sample collected 8-18-70 (mg/l except pH)	Range in values during period covered (mg/l except pH)	Number of analyses in range
Iron	9.0	9.0	0.0 - 12	11
Chloride	2.5	1.5	2.5 - 208	11
Nitrate	1.9	0.1	0.04 - 1.9	11
Total Solids	754	1040	684 - 1040	10
Hardness as CaCO <sub>3</sub>	438	569	399 - 569	11
pH	6.1	6.8	3.7 - 6.8	11

Table 5B: Results from Maryland Department of Health's sampling of water from on-site pond.<sup>16</sup>

Constituent or property	Sample collected 3-16-67 (mg/l except pH)	Sample collected 4-27-70 (mg/l except pH)	Range in values during period covered (mg/l except pH)	Number of analyses in range
Iron	0.3	100	0.2 - 2250	10
Chloride	6.0	192	0.5 - 231	9
Nitrate	0.1	3.0	0.1 - 3.0	9
Total Solids	248	3316	208 - 7058	9
Hardness as CaCO <sub>3</sub>	106	—	106 - 2310	9
pH	7.1	5.3	3.7 - 7.9	9

Groundwater samples were collected by the Water Resources Administration during the five years that the Hoffman Site was an active facility. The results of chemical analysis showed no evidence of contaminants moving from the landfill and into the groundwater observation wells. The report noted that some samples revealed elevated levels of heavy metals in the groundwater. The report further noted that this occurrence may be natural since the coal in the area of the Hoffman landfill is reported to contain high levels of heavy metals. In addition, a boron tracer was placed in the landfill to isolate contaminant specific to the activities at Hoffman. No boron was detected in the groundwater samples.<sup>5</sup>

The groundwater samples were also analyzed for pesticides and herbicides. The results detected some sulfur, but sulfur is again normally detected in coals of that region.<sup>5</sup>

## 5.2 MDE/HSWMA Contract Laboratory Sampling

The MDE/HSWMA CERCLA Pre-Remedial Division submitted the sampling plan for this site to the USEPA Region III on December 30, 1991. The site was sampled on June 23, 1992.

Samples were collected from groundwater, surface water, and soils from both on-site and off-site locations. These samples were collected and submitted in accordance with the USEPA Contract Laboratory Program (CLP) Routine Analytic Services (RAS), under case number 18347. The samples were analyzed for a full scan of all priority pollutants.

The samples were collected in five sample matrices: organic aqueous, organic soil (soil, sediment and leachate), inorganic aqueous, inorganic solid, and dissolved metals. Each matrix included the collection of a field duplicate sample and an additional matrix spike volume. In addition, each aqueous matrix was provided with a field blank sample, which consisted of deionized water poured into the sample containers in the field during the sampling event, and then submitted for analysis with the appropriate aqueous matrix. The sample collection log follows in Table 5C.

Table 5C: Sample Log

Sample Designation	QTR#	ITR#	Sample Location	Type	Remarks
GW-1	CKY-15	MCJY-08	[REDACTED]	Aqueous	
GW-2	CKY-16	MCJY-09	[REDACTED]	Aqueous	
GW-3	CKY-17	MCJY-10	[REDACTED]	Aqueous	
GW-4	CKY-18	MCJY-11	[REDACTED]	Aqueous	Spike
GW-5	CKY-19	MCJY-12	[REDACTED]	Aqueous	Duplicate

Sample Designation	QTR#	ITR#	Sample Location	Type	Remarks
GW-6	CKY-20	MCJY-13	On-Site Monitoring Well - Adjacent to the Comfort Inn	Aqueous	
SW-1	CKY-22	MCJY-15	Down stream from confluence of Hoffman drainage.	Aqueous	
SW-2	CKY-23	MCJY-16	Down stream from confluence of Hoffman drainage.	Aqueous	
SW-3	CKY-24	MCJY-17	On site.	Aqueous	
SW-4	CKY-25	MCJY-18	South of Braddock Run.	Aqueous	Background
LT-1	CKY-26	MCJY-19	On-site southeast of Comfort Inn.	Soil	Wetland area
SED-1	CKY-28	MCJY-21	Downstream from confluence of Hoffman drainage.	Sediment	
SED-2	CKY-29	MCJY-22	Downstream from confluence of Hoffman drainage.	Sediment	
SED-3	CKY-30	MCJY-23	On-site	Sediment	
SED-4	CKY-31	MCJY-24	South of Braddock Run.	Sediment	Background
S-1	CKY-32	MCJY-25	North west of the site.	Soil	Background
S-2	CKY-33	MCJY-26	20 feet southeast of concrete slab.	Soil	Background
S-3	CKY-34	MCJY-27	Approx. 150 feet east of Comfort Inn banquet room.	Soil	Partially decomposed waste within top 2 inches.
S-4	CKY-35	MCJY-28	25 feet from Route 36.	Soil	Clay soil - ditch with wildflowers and grass.
S-5	CKY-36	MCJY-29	22 feet east of apartments.	Soil	2 inch sample - low area
S-6	CKY-37	MCJY-30	200 feet south west of Comfort Inn.	Soil	
S-7	CKY-38	MCJY-31	Duplicate of S-3.	Soil	Duplicate of S-3

Sample collection was conducted 8:00 am to 4:00 on June 23, 1992. The samples were packaged on-site and transported to Federal Express that afternoon for shipment. The organic matrices were shipped to:

Compuchem Laboratories  
3308 Chapel Hill/Nelson Highway  
Research Triangle Park, NC 27709

The inorganic matrices were shipped to:

ETS Analytical Services  
2160 Industrial Drive

Salem, Va 24153

The discussion of the organic data review and the data summary forms are included as Attachment I. The discussion of the inorganic data review and the data summary forms are included as Attachment II. The detailed organic data package is presented in Attachment III of Volume II of this report. The detailed inorganic package is Attachment IV of Volume II of this report. The detailed inorganic data package is Attachment IV of Volume II.

### 5.2.1 Sampling Results

The trip blanks, which accompanied the samples from the time of collection until delivery to the organic laboratory, were analyzed to detect contamination introduced in the field. In addition, lab blanks were also collected in order to isolate contamination introduced during the lab analysis. The following organic contaminants were detected in the water blanks and the highest concentration in which they were detected is listed below: bis(2-Ethylhexyl)phthalate 2  $\mu\text{g/L}$ , methylene chloride 22  $\mu\text{g/L}$ , and acetone 15  $\mu\text{g/L}$ .

Inorganic analysis of the field blank sample also detected contamination. The unfiltered blank sample revealed calcium 9.7  $\mu\text{g/L}$ , iron 5.6  $\mu\text{g/L}$ , and zinc 4.0  $\mu\text{g/L}$ . The filtered metals blank contained barium 1.5  $\mu\text{g/L}$ , calcium 319  $\mu\text{g/L}$ , iron 12.1  $\mu\text{g/L}$ , magnesium 47.6  $\mu\text{g/L}$ , manganese 4.3  $\mu\text{g/L}$ , sodium 181  $\mu\text{g/L}$ , and zinc 29.3  $\mu\text{g/L}$ .

### 5.2.2 Groundwater Sampling Results

Groundwater samples were collected from the Clarysville system which is a spring that serves approximately 28 people (GW-1), 1 residential wells (GW-2/GW-5), a golf course well (GW-3), and an on-site monitoring well (GW-6). In addition, a background residential well samples, GW-4, was also collected (Figure 8 & 9).

GW-2/GW-5 was collected from a well that, according to the well drillers, was deepened to 372 feet just prior to sampling.<sup>13</sup> Consequently, the owners had been treating the well with chlorine. GW-3 was collected from a well at the Maple Hurst County Club. The water from this well is only used to fill the ponds at the golf course. This well is approximately 300 feet deep. The background well, GW-4 was collected from a depth of 175 feet. The owners of this well said that they had a water softener.

In addition, the groundwater analysis also included the collection of one monitoring well sample on-site. This monitoring well, which was believed to be monitoring well 3, was installed with one-half inch opening per foot of pipe.<sup>5</sup> As a result, surface water is able to flow into this monitoring well. Because of this possible surface water infiltration, the results from this sample may not accurately represent the condition of the groundwater in the

aquifer sampled. On the day of sampling, this well was found to be 37.85 feet to water, and 70.5 feet to the bottom of the well. The monitoring well was purged of three times the volume of the water standing in the well casing. The purging was accomplished using a truck-mounted pump. Samples were collected from the monitoring well using plastic hand bailers.

Organic analysis detected vinyl chloride at 2 ppb in the on-site monitoring well sample. No organic contamination at reportable quantity levels was detected in the residential well samples. A reportable quantity is defined as a concentration which is greater than three times background and that is greater than 10 times the blank sample for common laboratory contaminants and greater than 5 times the blank for other contaminants.

Inorganic compounds were detected in all of the residential well samples. Only GW-2/GW-5 a residential well, and GW-3 the golf course well, detected concentrations exceeding three times background. The table below outlines these samples of concern.

Table 5D:

Contaminant	GW-4 (Background) ug/L	GW-2/GW-5 (ug/L)	GW-3 (ug/L)
arsenic	--	--	7.0
barium	28.7	137/133	206
beryllium	--	[0.39B]/[0.29B]	[2.7]
cobalt	--	--	13.2
copper	50	*/*	271
iron	1530	*/*	172000
lead	7.5	*/*	35.3
manganese	31.6	*/*	577
zinc	25.4	*/*	561

Legend

--: not detected

\*: not greater than three times background

B: not detected substantially above the level reported in lab or field blank

[ ]: analyte. As values approach the IDL the quantitation may not be accurate

GW-3, the well with the highest concentrations of contaminants, had not been used in over a year. The field notes from the sampler who collected GW-3 indicated that when the water was turned on it had a "rust color." The water was run for approximately 10-20 minutes but still had a slight rust color to it when the sample was collected (see photographs). Therefore, this inorganic contamination was not considered attributable to the site and was not used in the overall evaluation of the facility.

See Table 1C for the inorganic contaminants detected in the monitoring well sample.

### 5.2.3 Surface Water Sampling Results

Four surface water/sediment samples were collected from on-site and off-site locations. SW-1/Sed-1 was taken downstream from the Hoffman Drainage tunnel. The Hoffman Drainage Tunnel is a two mile long shaft which drains the subsurface mines below the Hoffman, Cabin Run, and Vale Summit Landfills.<sup>6</sup> At this point, the water was shallow and flowing well. No visible signs of contamination were noticed (see photographs). SW-2/Sed-2 was taken from Braddock Run east of Clarysville. At this location, the water was flowing fast and the water and the sediment were heavily stained (see photographs). No background sample was collected upstream of the SW-2/Sed-2. SW-3/Sed-3 was collected from a pond on-site. SW-4/Sed-4 was collected south of Braddock run as a background sample (Figure 10).

No organic contamination was detected in the surface water samples. All of the surface water samples contained inorganic contamination exceeding three times background concentrations. SW-1 contained lead at 1.5  $\mu\text{g/l}$ , and iron at (740  $\mu\text{g/L}$ ). The contaminants of concern for SW-2 are: cobalt (37.8 $\mu\text{g/L}$ ), iron (5800  $\mu\text{g/L}$ ), manganese (3020  $\mu\text{g/L}$ ), magnesium (44600  $\mu\text{g/L}$ ) and nickel (78.7  $\mu\text{g/L}$ ). The SW-3 sample detected iron (3140  $\mu\text{g/L}$ ), manganese (429  $\mu\text{g/L}$ ) and potassium (4300  $\mu\text{g/L}$ ).

Organic contamination was detected in the sediment samples. Sed-2, contained several PAHs at low concentrations; phenanthrene (130ug/kg), pyrene (85ug/kg), benzo[a]anthracene (110ug/kg), chrysene (120ug/kg), benzo[b]fluoranthene (250ug/kg), benzo[k]fluoranthene (250ug/kg), benzo[a]pyrene (120ug/kg), 4-methylnapthalene 92  $\mu\text{g/kg}$ , and indeno-(1,2,3-cd)pyrene (64ug/kg). Sed-3 contained phenanthrene (56ug/kg) and 4-methylphenol (62ug/kg).

Sed-4 contained 4,4-DDE (0.38ug/kg).

Toluene was detected at 1  $\mu\text{g/kg}$  in Sed-1.

Inorganic contaminants were detected at greater than three times background at the Sed-2 sample location. The following of concern were detected: chromium 332 mg/kg and cobalt 180 mg/kg.

### 5.2.4 Soil Sampling Results

Seven soil samples and one leachate sample were collected from on-site. S-1 served as the background sample and was collected northwest of the site. S-2 was taken southeast of the site. S-3 and S-7 were duplicates and were taken approximately 150 feet east of the Comfort Inn banquet room. S-4 was taken 25 feet from State Highway 36. S-5 was taken 200 feet east of the apartments. S-6 was taken within 200 feet of the Comfort Inn. The leachate sample was taken in a small wetland area on the site (Figure 11).

The leachate sample did not contain any contaminants whose concentrations exceeded three times background. Fluoranthene and Endosulfan I were detected in Soil 3/7 sampling locations. Various other organics at very low concentrations were detected in Soil-4, Soil-5, and Soil-6. See Table 5 for a complete list of the contaminants detected. Partially decomposed waste (cans, plastic, glass) was detected within the top two inches of the soil in S-3/S-7.

Inorganic contamination revealed very little contamination which exceeded three times background. S-3/S-7 contained mercury (0.19mg/kg and 0.16mg/kg respectively) and cyanide (0.45mg/kg and 0.71mg/kg respectively). S-4 contained cyanide (0.23mg/kg). S-5 and S-6 did not contain any inorganic contamination which exceeded three times background.

## 6.0 Toxicological Evaluation

The Hoffman Landfill is a former coal strip mine which was converted to a sanitary landfill in 1967. The site is located on the southeast edge of the city of Frostburg, in Allegany County, Maryland, and covers 22 acres adjacent to the Frostburg Industrial Park. Six buildings within 200 feet of the site include an apartment building (30 feet from the site), a nursing home, a bank and a hotel. Beall High School is located 0.7 miles from the site.

Samples were taken from sediment, surface water, surface soil and groundwater on and around the site. Few organic contaminants were detected in any of these media, and only vinyl chloride which was found in the on-site monitoring well exceeded EPA benchmark concentrations<sup>22</sup>. Lead was also detected in the groundwater on-site at concentrations which exceed the MCL. Of the inorganic compounds detected, arsenic and beryllium were detected in soil and sediment at levels exceeding EPA benchmark concentrations for surface soil.

Surface water and sediment samples were taken from an intermittent stream and pond on site. When flowing, the stream is a tributary of Braddock Run which flows one mile east of site and joins Wills Creek just north of Cumberland, and then flows south to the Potomac River.

Exposure pathways of concern at this site include incidental ingestion of and dermal contact with surface soil. It is not known at this time if any of the 450 residential wells within four miles of the site are hydrogeologically downgradient of the site.

Worst case scenarios were used in the following quantitative evaluations. While these exposure scenarios are unlikely, they were used in order to protect potentially exposed populations:

1. For surface soil and exposed sediment, the residential exposure scenario assumes that a 70 kg adult ingests 100 mg of soil per day, 350 days per year, for 30 years, and a 15 kg child ingest 200 mg of soil per day for six years. The trespasser scenarios are the same, but assume an exposure frequency of 150 days per year.
2. For groundwater, the residential exposure scenario assumes that a 70 kg adult ingests two liters of water per day, 350 days per year, for 30 years, and a 15 kg child ingests one liter per day, 350 days per year, for six years.

## Support Data

### Organics:

#### Vinyl Chloride

Vinyl chloride was detected in the on-site monitoring well at a concentration of 2 ppb. This exceeds the EPA benchmark for tap water of 0.025  $\mu\text{g/l}$ .<sup>22</sup>

EPA has classified vinyl chloride as a Group A known human carcinogen, with a potency factor of 1.9  $\text{mg/kg/day}^{-1}$ .<sup>25</sup> Assuming the adult residential drinking water scenario, the daily intake would be 2.3E-5  $\text{mg/kg/day}$ . The resulting cancer risk would be 4.4E-5. This risk exceeds EPA's point-of-departure for carcinogenic risks (1.0E-06), but falls within the range that may be considered acceptable by EPA (1.0E-06 to 1.0E-04).

### Inorganics:

#### Arsenic

Arsenic is a naturally occurring element in the earth's crust. Pure arsenic is a gray-colored metal, but this form is not common in the environment. Rather, arsenic is usually found combined with one or more other elements such as oxygen, carbon, chlorine, and sulfur, which determine its form as inorganic or organic. Arsenic combined with inorganic elements is referred to as inorganic arsenic, whereas arsenic combined with carbon and hydrogen is referred to as organic arsenic. It is important to maintain a distinction between inorganic and organic arsenic, since the organic forms are usually less toxic than the inorganic forms<sup>24</sup>. Typical concentrations for arsenic in the Eastern United States range from less than 0.1 ppm to 73 ppm.<sup>26</sup> EPA has categorized arsenic as a Group A carcinogen<sup>25</sup>.

Data gathered at the Hoffman Landfill site do not give arsenic concentrations by specific form. Several soil and sediment samples contained arsenic levels in excess of the benchmark for arsenic as a carcinogen. Arsenic levels detected in surface soil were evaluated to determine the potential risk for trespassers incidentally ingesting soil.

Arsenic is not readily absorbed through the skin, and incidental dermal contact is not likely to cause irritation. Assuming a worst-case residential scenario (described above) in which all available arsenic is in the most toxic form, the chronic daily intake of the maximum arsenic level in off-site sediment (10.6  $\text{mg/kg}$ ) would be 1.2E-05  $\text{mg/kg/day}$ . Based on a potency factor of 1.75  $\text{mg/kg/day}^{-1}$ , this dose poses a carcinogenic risk of 2.0E-05. This risk exceeds EPA's point-of-departure for carcinogenic risks (1.0E-06), but falls within the range that may be considered acceptable by EPA (1.0E-06 to 1.0E-04). This dose is also below the acceptable daily intake (or Reference dose) that protects for noncarcinogenic effects. Risk from exposure to arsenic in surface soil also exceeds EPA's

point-of-departure for carcinogenic risks ( $1.0\text{E-}06$ ), but falls within the range that may be considered acceptable by EPA ( $1.0\text{E-}06$  to  $1.0\text{E-}04$ ) since the maximum concentration detected in soil, 7.9 mg/kg in the background sample, is less than in sediment.

### **Beryllium**

Like arsenic, beryllium was detected at elevated concentrations in several soil and sediment samples. Typical beryllium concentrations in the Eastern United States range from less than 1 ppm to 7 ppm.<sup>26</sup> The highest concentration in which beryllium was detected was 1.7 mg/kg in off-site sediment.

Beryllium is classified by USEPA as a B2 carcinogen with an oral potency factor of  $4.3 \text{ mg/kg/day}^{-1}$ <sup>25</sup>. Assuming a worst-case residential scenario for incidental ingestion of on-site sediment, the chronic daily intake of beryllium would be  $1.8\text{E-}06 \text{ mg/kg/day}$ . This dose would result in a carcinogenic risk of  $7.7\text{E-}05$ . This risk exceeds EPA's point-of-departure for carcinogenic risks ( $1.0\text{E-}06$ ), but falls within the range that may be considered acceptable by EPA ( $1.0\text{E-}06$  to  $1.0\text{E-}04$ ). Risk from exposure to beryllium in surface soil is also falls within the range considered acceptable as the maximum concentration in soil is less than in sediment.

In addition, beryllium was also detected in the residential well sample GW-2/GW-5 at concentrations of  $0.39 \text{ } \mu\text{g/l}$  and  $0.29 \text{ } \mu\text{g/l}$  respectively. These concentrations exceed the health based concentration of  $0.02 \text{ } \mu\text{g/L}$ , but do not exceed the MCL of  $1 \text{ } \mu\text{g/l}$ .

### **Lead**

Elevated lead levels were detected in several groundwater samples from the Hoffman site. Because no threshold dose for lead has been established that does not pose a risk of adverse neurological effects, EPA has withdrawn the original RfD for lead. The existing Maximum Contaminant Level (MCL),  $0.005 \text{ mg/l}$ , for lead is based on best available control technology. Because lead levels detected at the Hoffman site exceed the MCL, ingesting this water poses a risk of neurotoxicity. It should be noted that water from these wells are not currently used for drinking.

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ORIGINAL  
(Red)

*8.0 Photographs*



Sample being collected from the <sup>ORIGINAL</sup> Clarysville System. This sample was labeled GW-1.



Sample taken from the golf course (GW-3). This sample was collected from the white pipe. Note that the water is stained.



Sample Location for Surface Water-1  
and Sediment-1.

ORIGINAL  
(Red)



Location of Surface Water-2  
and Sediment-2.

ORIGINAL  
(red)



Sample Location for Surface Water-4  
and Sediment-4.

ORIGINAL  
(Red)

## 9.0 Tables

ORIGINAL  
(Red)

Table 1A: Inorganic Results from Groundwater Samples.  
Concentrations are recorded as  $\mu\text{g/L}$ .

Compound	GW-4 (background)	GW-1	GW-2/GW-5	GW-3
Aluminum	[112]	--	*/*	*
Arsenic	--	--	--/--	[7.0]
Barium	[28.7]	*	[137]/[133]	206
Beryllium	--	--	[0.398]/[0.298]	[2.7]
Calcium	139000	*	*/*	*
Chromium	[2.2]	--	--	*
Cobalt	--	--	--/--	[13.2]
Copper	50	--	*/*	271
Iron	1530	*	*/*	172000
Lead	7.5	--	*/*	35.3
Magnesium	22100	*	*/*	*
Manganese	31.6	*	*/*	577
Nickel	--	--	--	[13.4]
Potassium	[1440]	*	*/*	*
Sodium	[1640]	*	*/*	13100
Zinc	25.4	*	*/*	561

Legend

- \* Detected, but not greater than three times background
- not detected
- [ ] As value approaches the IDL the quantitation may not be accurate
- B Not detected substantially above the level reported in the field or lab blank

ORIGINAL  
(Red)

Table 1B: Organic results from groundwater samples. Concentrations are recorded as  $\mu\text{g/L}$ .

Compound	GW-4 (background)	GW-1	GW-2/GW-5	GW-3
chloroform			4 J/4 J	
lindane	.0039 J			

Legend

blank space

not detected

J

estimated value

Table 1C: Results from the onsite monitoring well sample. The unfiltered sample is listed as 'GW-6,' the filtered sample as Dissolved Metals GW-6. In addition, a duplicate sample of the filtered sample was collected and the results are recorded under 'DUP.' All concentrations are recorded as  $\mu\text{g/L}$ .

Compounds	GW-4 (background)	GW-6	Dissolved Metals GW-6/DUP
Aluminum	[112]	*	--/*
Arsenic	--	[1.4]	--/--
Barium	[28.7]	238	222/222
Beryllium	--	--	--/--
Cadmium	--	--	--/--
Calcium	139000	*	*/*
Chromium	[2.2]	--	--/--
Cobalt	--	[1.9]	--/[3.2]
Copper	50	*	--/--
Iron	1530	9300	8170J/8150J
Lead	7.5	*	--/--
Magnesium	22100	*	*/*
Manganese	31.6	490	484J/476J
Mercury	--	--	--/--
Nickel	--	--	--/--
Potassium	[1440]	*	*/*
Selenium	--	--	--/--
Sodium	[1640]	*	*/*
Vanadium	--	--	--/--
Zinc	25.4	*	*/*
Cyanide		Q	Q/Q

## Legend

- \* Detected, Not greater than three times background
- [ ] As value approaches the IDL the quantitation may not be accurate
- Q No analytical result
- J Reported value may not be accurate or precise
- not detected

Table 1D: Organic contamination detected in the on-site monitoring well samples. Concentrations are recorded as  $\mu\text{g/l}$ .

Compound	GW-6
vinyl chloride	2
lindane	.0099 J

## Legend

- J Estimated Value

Table 2: Inorganic Analysis of Surface Water Samples.  
Concentrations are recorded as  $\mu\text{g/L}$ .

Compounds	Leachate-1	SW-4 (Background)	SW-1	SW-2	SW-3
Aluminum	3530	378	*	*	--
Arsenic	[2.7]	--	--	[1.1]	--
Barium	*	[49.1]	*	*	*
Beryllium	--	--	--	0.24 B	--
Calcium	*	21800	*	117000	*
Chromium	[5.3]	--	--	--	--
Cobalt	*	[2.7]	*	[37.8]	--
Copper	[15.2]	--	[3.9]	--	--
Iron	12000	195	740	5800	3140
Lead	10.7	[0.40]	1.5	--	--
Magnesium	*	5950	*	44600	[4650]
Manganese	327	77.9	*	3020	429
Nickel	*	[11.9]	*	78.7	--
Potassium	*	[1090]	*	*	[4300]
Sodium	*	5040	*	*	*
Zinc	*	25.5 B	*	*	B

## Legend

- \* Detected, but not greater than three times background
- [ ] Analyte present. As values approach the IDL the quantitation may not be accurate
- Not Detected
- B Not detected substantially above the level reported in lab or field blanks
- J Reported Value May Not be Accurate or Precise

In addition, Endosulfan Sulfate at  $0.0082 \text{ J } \mu\text{g/l}$  and Methoxychlor at  $0.019 \text{ B } \mu\text{g/l}$  were detected in the leachate sample.

ORIGINAL  
(Red)

Table 3: Organic Analysis of Sediment Data. Concentrations are recorded as  $\mu\text{g}/\text{kg}$ .

Compound	Sed-4 (Background)	Sed-1	Sed-2	Sed-3
Toluene		1		
Fluoranthene			120J	
Phenanthrene			130J	56 J
Pyrene			85J	
Benzo[a]Anthracene			110J	
Chrysene			120J	
Benzo[b]Fluoranthene			250 J	
Benzo[k]Fluoranthene			250 J	
Benzo[a]Pyrene			120J	
Indeno-(1,2,3-cd)Pyrene			64J	
4-Methylphenol				62J
4-methylnaphthalene			92 J	
4,4-DDE	0.38			

Legend

J Estimated Value  
blank space Not detected

ORIGINAL  
(Red)

Table 4: Inorganic Results for Sediment Samples. Values are recorded as mg/kg.

Compound	Sed-4 (Background)	Sed-1	Sed-2	Sed-3
Aluminum	4260	*	*	*
Arsenic	3.6	*	*	*
Barium	86.5	*	*	*
Beryllium	1.7	*	*	*
Cadmium	[0.55]	--	--	--
Calcium	1290	10000	10400	*
Chromium	12.2	*	332	*
Cobalt	54.1	*	180	*
Copper	16.1	*	*	*
Iron	27900	*	*	*
Lead	15.7	*	*	*
Magnesium	[785]	*	*	*
Manganese	1480	*	13500	*
Mercury	--	--	--	--
Nickel	89.1	*	*	*
Potassium	[577]	*	*	*
Selenium	[0.34] L	*	1.8	*
Sodium	[44.4]	*	*	*
Vanadium	[11.7]	*	*	*
Zinc	188 J	*	*	*

**Legend**

- \* Detected, Concentration does not exceed three times background
- [ ] Analyte present. As values approach the IDL the quantitation may not be accurate
- Not Detected
- J Analyte present. Reported value may not be accurate or precise
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher

ORIGINAL  
(Red)

Table 5: Organic Results from Soil Samples. Values are recorded as  $\mu\text{g}/\text{kg}$

Compound	Soil-1 (Backgd)	Soil-2	Soil-3/Soil-7	Soil-4	Soil-5	Soil-6
Fluoranthene			39J/61J			
Phenanthrene			--/--	47J		
Pyrene			--/55J			
Benzo[b]Fluoranthene			--/61J			
Benzo[k]Fluoranthene			--/61J			
Endosulfan I			0.40J/0.34J			
alpha-BHC			--/--	0.100J		
gamma-Chlordane			--/--	0.41J		
4,4'-DDE			--/--		0.97J	
Endrin Ketone			--/--			0.12J

Legend

J Estimated Value  
 -- Not detected  
 blank space Not detected

ORIGINAL  
(Red)

Table 6: Inorganic Results from Soil Samples. Concentrations are recorded as mg/kg

Compounds	S-1 (Backgd)	S-2	S-3/S-7	S-4	S-5	S-6
Aluminum	8270	*	*/*	*	*	*
Arsenic	7.9	*	*/*	*	*	*
Barium	142	*	*/*	*	*	*
Beryllium	[1.1]	*	*/*	*	*	*
Cadmium	[0.42]	--	--/--	--	--	--
Calcium	2640	*	*/*	*	*	*
Chromium	12.0	*	*/*	*	*	*
Cobalt	19.3	*	*/*	*	*	*
Copper	28.7	*	*/*	*	*	*
Iron	33900	*	*/*	*	*	*
Lead	35.0	*	*/*	*	*	*
Magnesium	[1030]	*	*/*	*	*	*
Manganese	1170	*	*/*	*	*	*
Mercury	--	--	0.19/0.16	--	--	--
Nickel	22.2	*	*/*	*	*	*
Potassium	1240	*	*/*	*	*	*
Selenium	[0.35] L	--	*/*	--	*	*
Sodium	[119]	*	*/*	*	*	*
Vanadium	18.3	*	*/*	*	*	*
Zinc	78.0 J	*	*/*	*	*	*
Cyanide	--	--	[0.45]/0.71B	[0.23]	--	--

Legend

- \* Detected, Not greater than three times background
- [ ] Analyte present. As values approach the IDL the quantitation may not be accurate
- Not Detected
- L Analyte present. Reported value may be biased low. Actual value is expected to be higher
- J Analyte present. Reported value may not be accurate or precise

Note: S-3 and S-7 are Duplicate Samples

ORIGINAL  
(Red)

Table 7: Pesticide data for sediment samples. Values are recorded as  $\mu\text{g}/\text{kg}$ .

Contaminant	SED-1	SED-2	SED-3	SED-4 (background)
Lindane		0.079 J		
heptachlor	0.17 J	0.35 J	0.48 J	0.25 J
dieldrin		0.072 J		
4,4'-DDE	0.20 J	0.64 J	0.39 J	0.38 J
endrin		0.47 J		
4,4'-DDD		0.15 J		0.51 J
4,4'-DDT				0.15 J
endrin ketone	0.18 J	0.31 J		
alpha-chlordane		0.36 J		
gamma-chlordane		0.46 J		0.16 J

Legend

J Estimated Value  
-- Not detected  
blank space Not detected

Table 8: Pesticide data for soil samples. Values are recorded as  $\mu\text{g}/\text{kg}$ .

Contaminant	S-1 (background)	S-2	S-3/S-7	S-4	S-5	S-6
alpha-BHC		0.25 J		0.100 J		
lindane	0.25 J	0.16 J	0.13 J/nd	0.41 J	0.37 J	0.12 J
heptachlor	0.13 J	0.065 J	/0.094	0.050 J		
aldrin		0.65 J	0.58 J/0.37 J			
Heptachlor epoxide		0.18 J	0.30 J/0.26 J	0.10 J		
Endosulfan I		0.13 J	0.40 J/0.34 J	0.30 J		
dieldrin	0.20 J		/0.33 J			
4,4'-DDE					0.97 J	
endrin		0.075 J	0.59 J/0.56 J	0.27 J	0.51 J	
endosulfan sulfate		0.096 J				
4,4'-DDT	0.16 J		/1.3 J		1.2 J	
methoxychlor				9.4 J		
endrin ketone	0.66 J		0.15 J/	0.47	0.17 J	0.12 J
alpha-chlordane			0.55 J/0.48 J	0.39 J		
gamma-chlordane	0.072 J	0.41 J	0.67 J/0.51 J	0.41 J	0.45 J	
endosulfan II			0.31 J/	0.22 J		

## Legend

J Estimated Value  
 -- Not detected  
 blank space Not detected

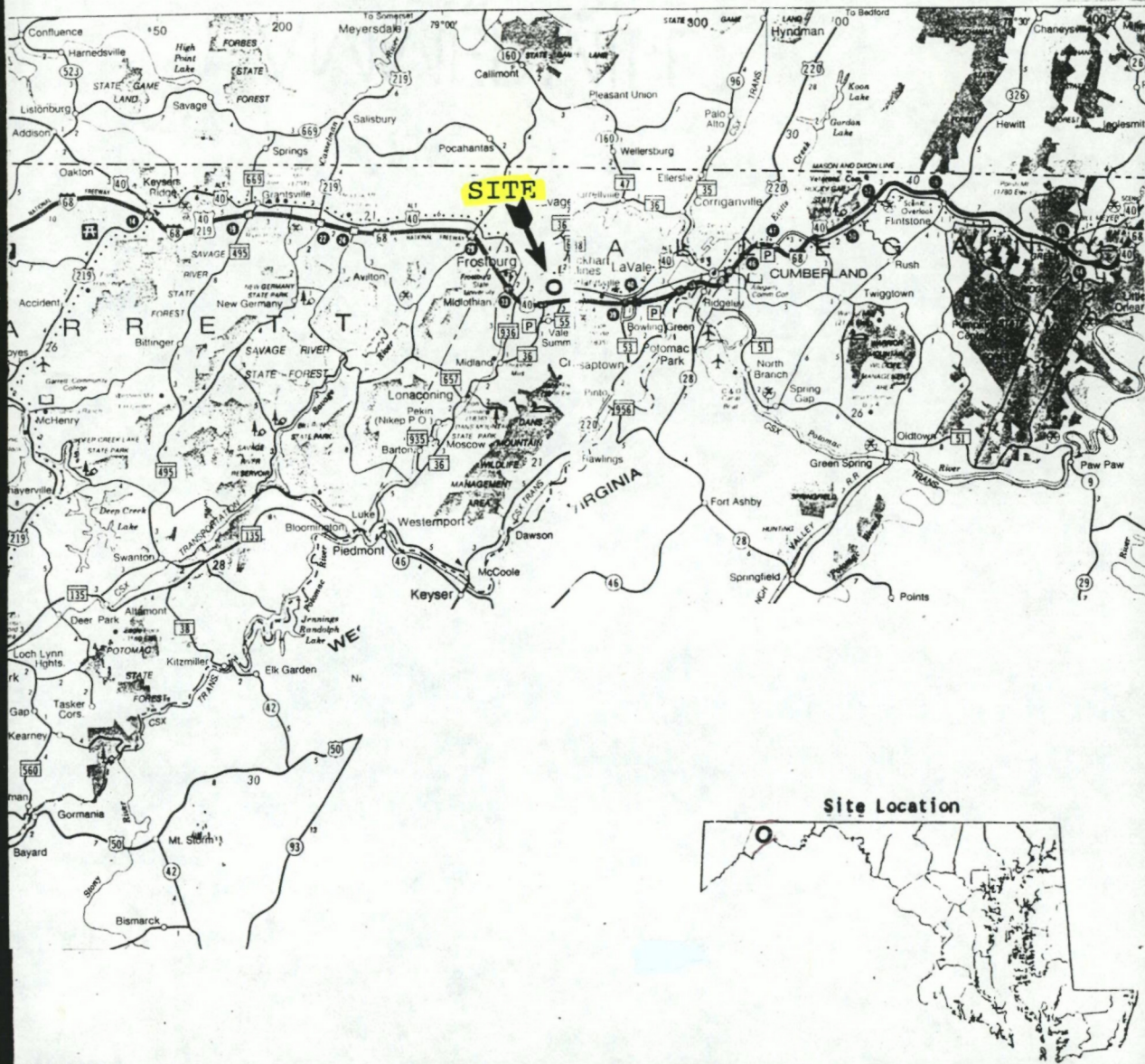
ORIGINAL  
(Red)

*10.0 Figures*

ORIGINAL  
(red)

# Regional Highway Map

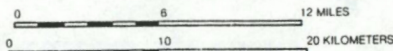
Figure 1

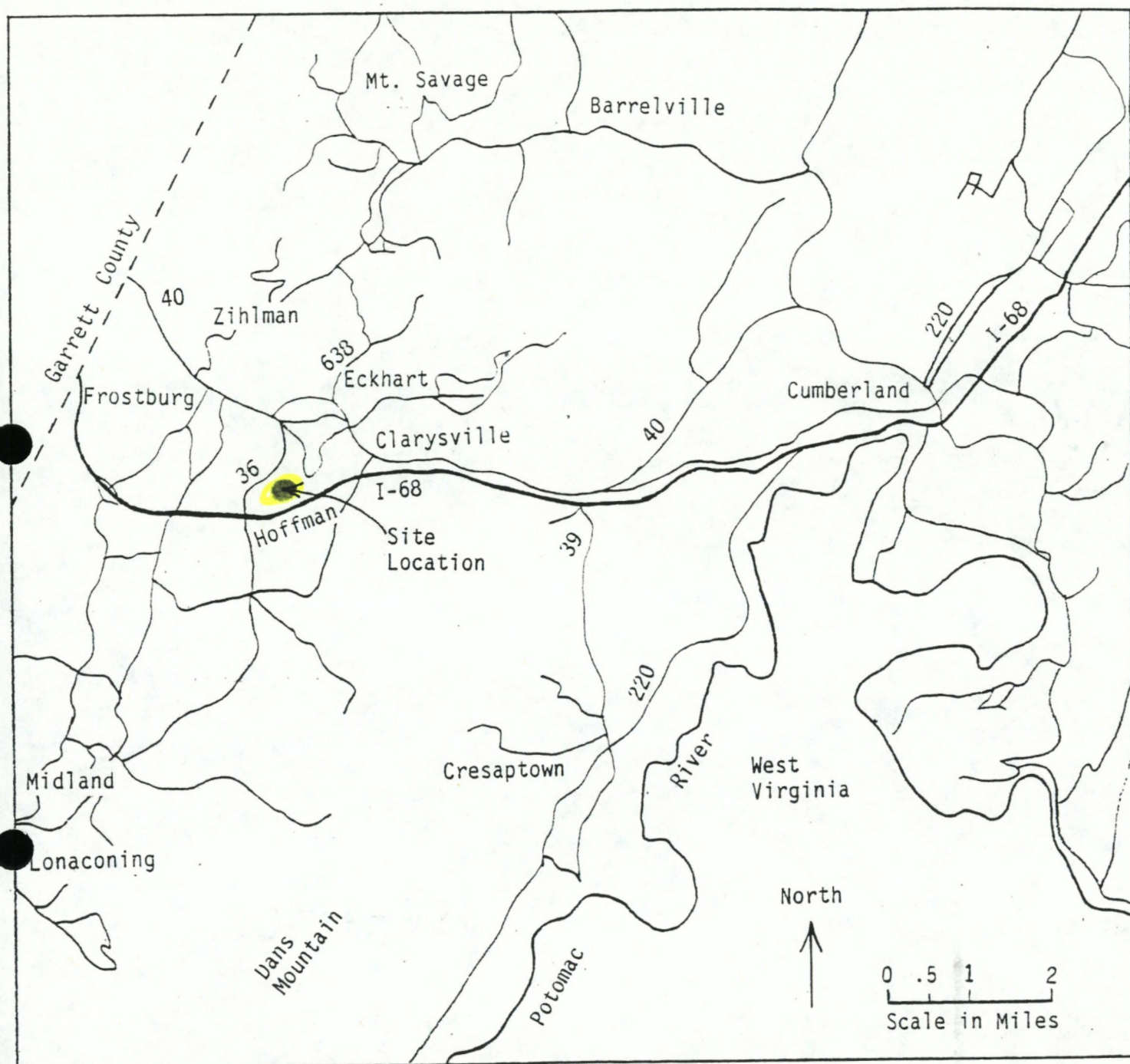


SHA 1989

N

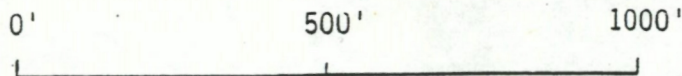
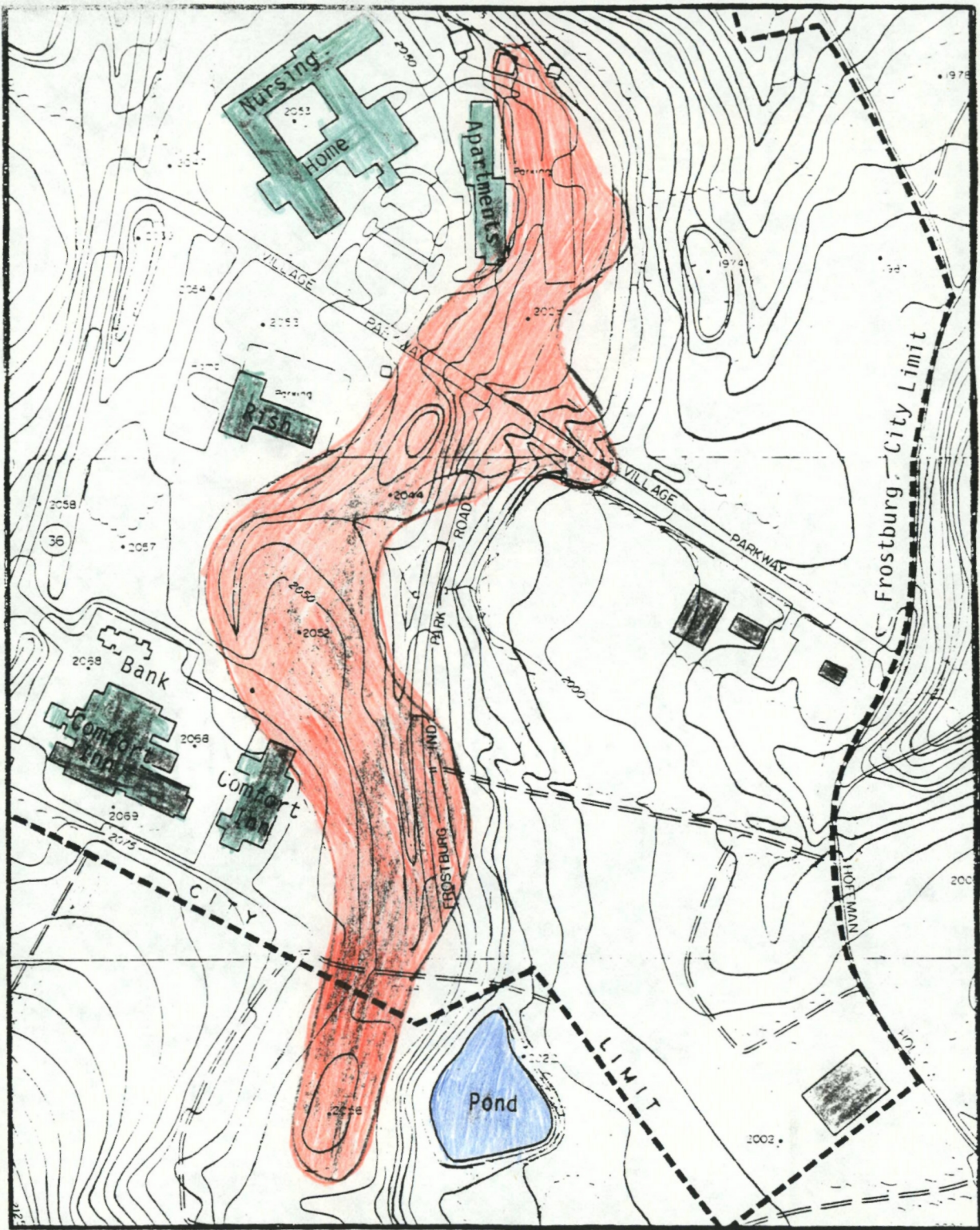
SCALE





**Figure 2** - Index Map of western Allegany County, Maryland, showing towns, roads, and location of the Hoffman Landfill.

ORIGINAL  
(Red)



Scale

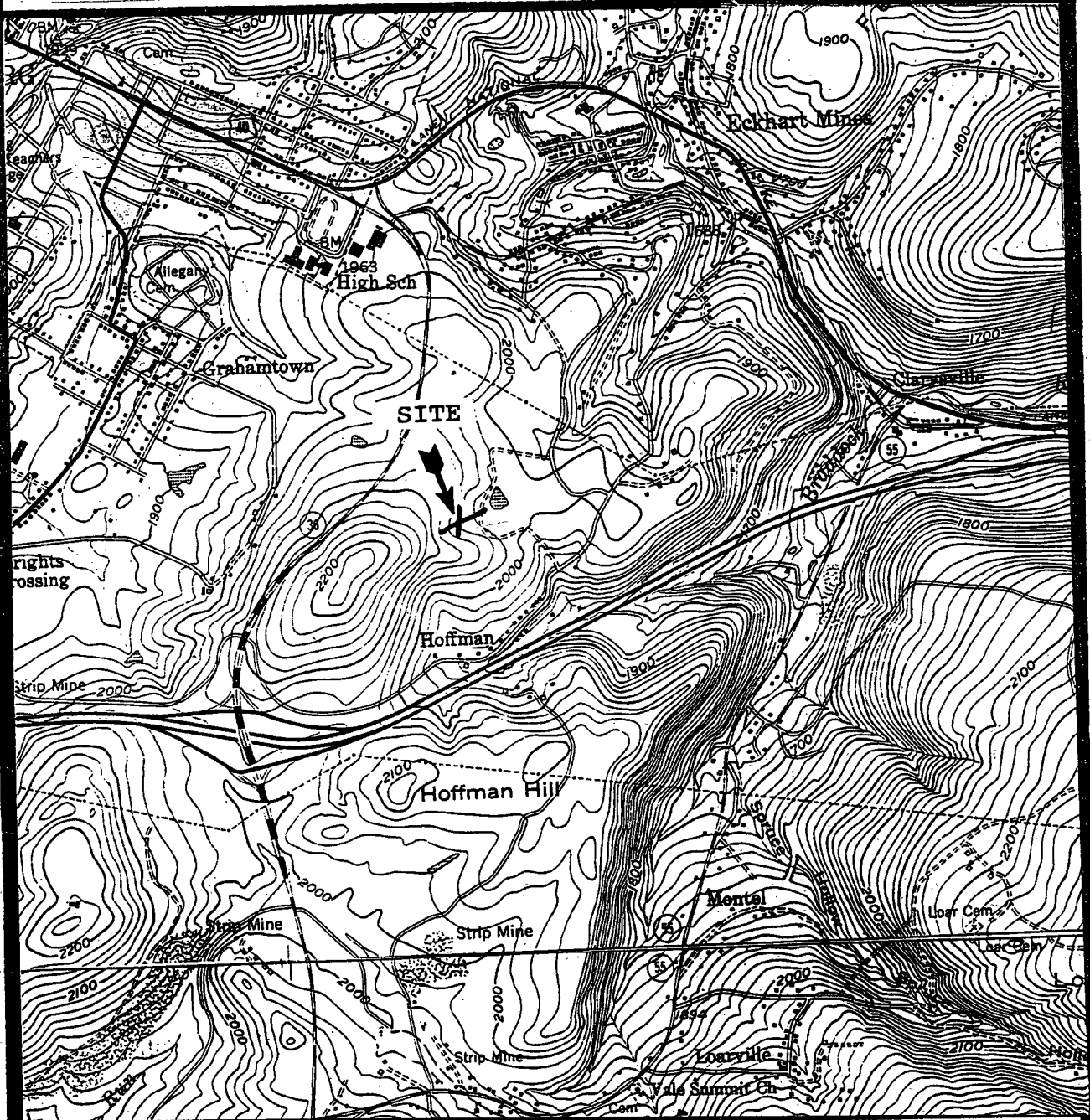
North



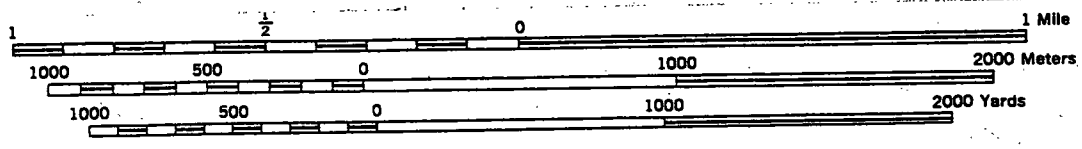
Figure 3 - Map showing the locations of buildings in the Frostburg Industrial Park. Red shaded area is the approximate area of the Hoffman Landfill.

# Local Topography

Figure 4

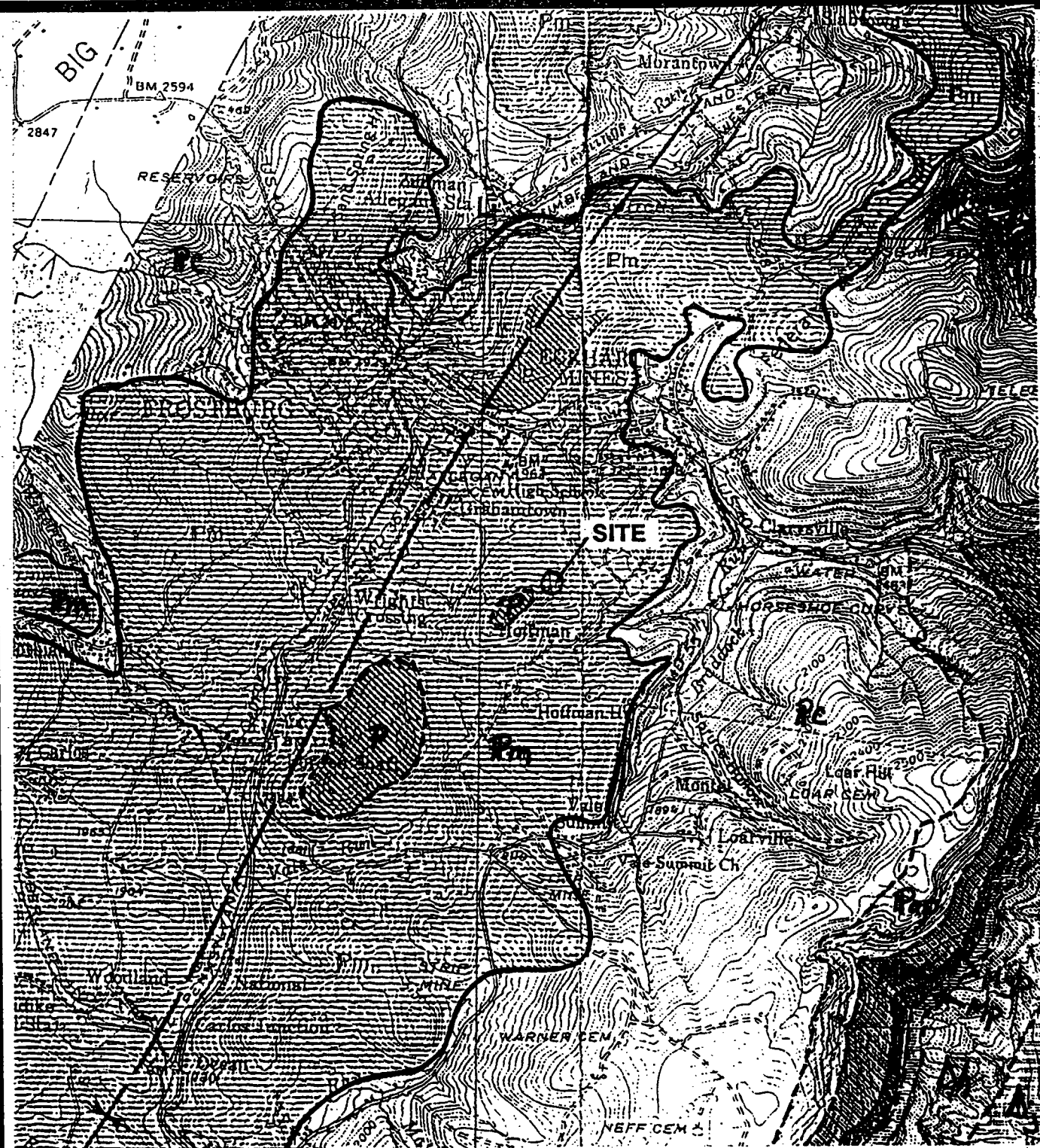


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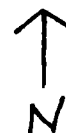
## GEOLOGIC MAP

FIGURE 5



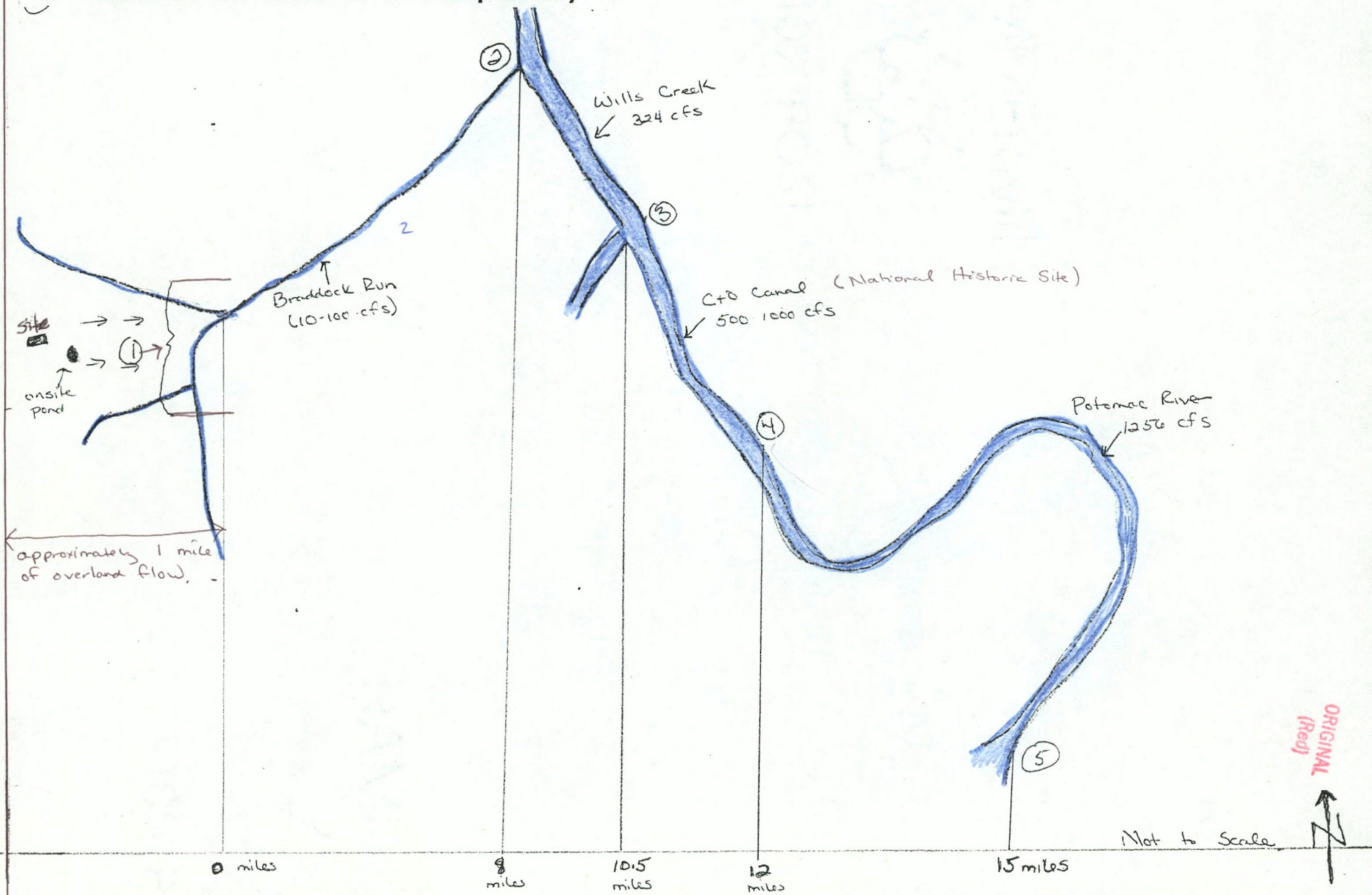
P - Permian Undifferentiated  
 Pm - Monongahela Formation  
 Pc - Conemaugh Formation  
 Pap - Allegheny and Pottsville Formations  
 Undifferentiated  
 Mmc - Mauch Chunk Shale

Mgb - Greenbrier Formation  
 Mp - Pocono Formation  
 Dh - Hampshire Formation  
 Dj - Jennings Formation



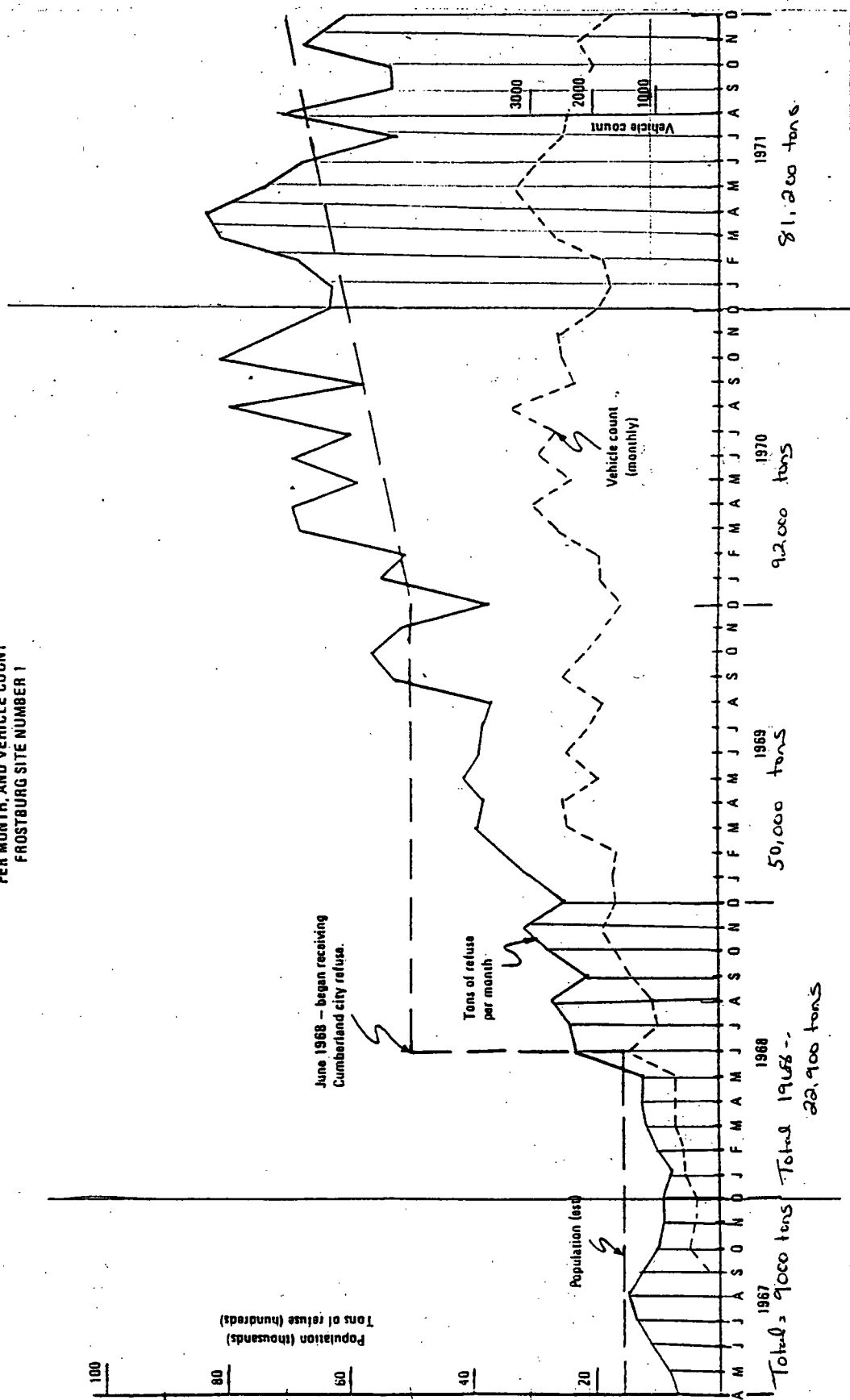
15-Mile Surface Water Pathway Fig. 6

1. probable point of entry (ppe)
2. Confluence of Braddock Run and Wills Creek
3. Confluence of Wills Creek and C & O Canal
4. Confluence of C & O Canal and Potomac River
5. Potomac River to end of 15-mile pathway



# Quantity of Municipal Refuse Received at the Hoffman Site from April 1967 through 1971.

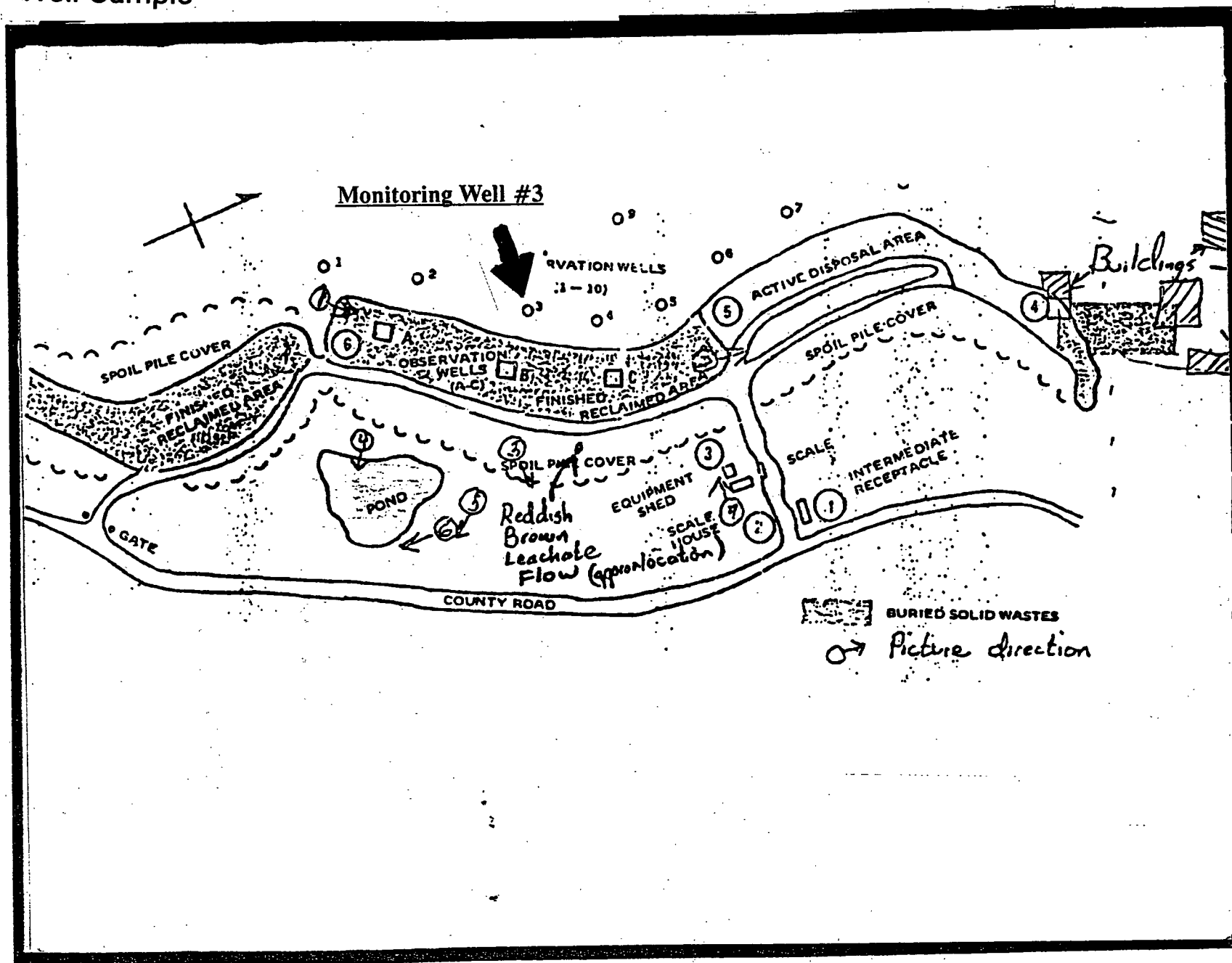
ESTIMATED POPULATION SERVED, TONS OF REFUSE  
PER MONTH, AND VEHICLE COUNT  
FROSTBURG SITE NUMBER 1



Source: "Use of Abandoned Strip Mines..." MD Dept of Health and Mental Hygiene (1973)

# Location of Monitoring Well Sample

Figure 8



ORIGINAL  
(Red)

Location of Residential  
Well Samples

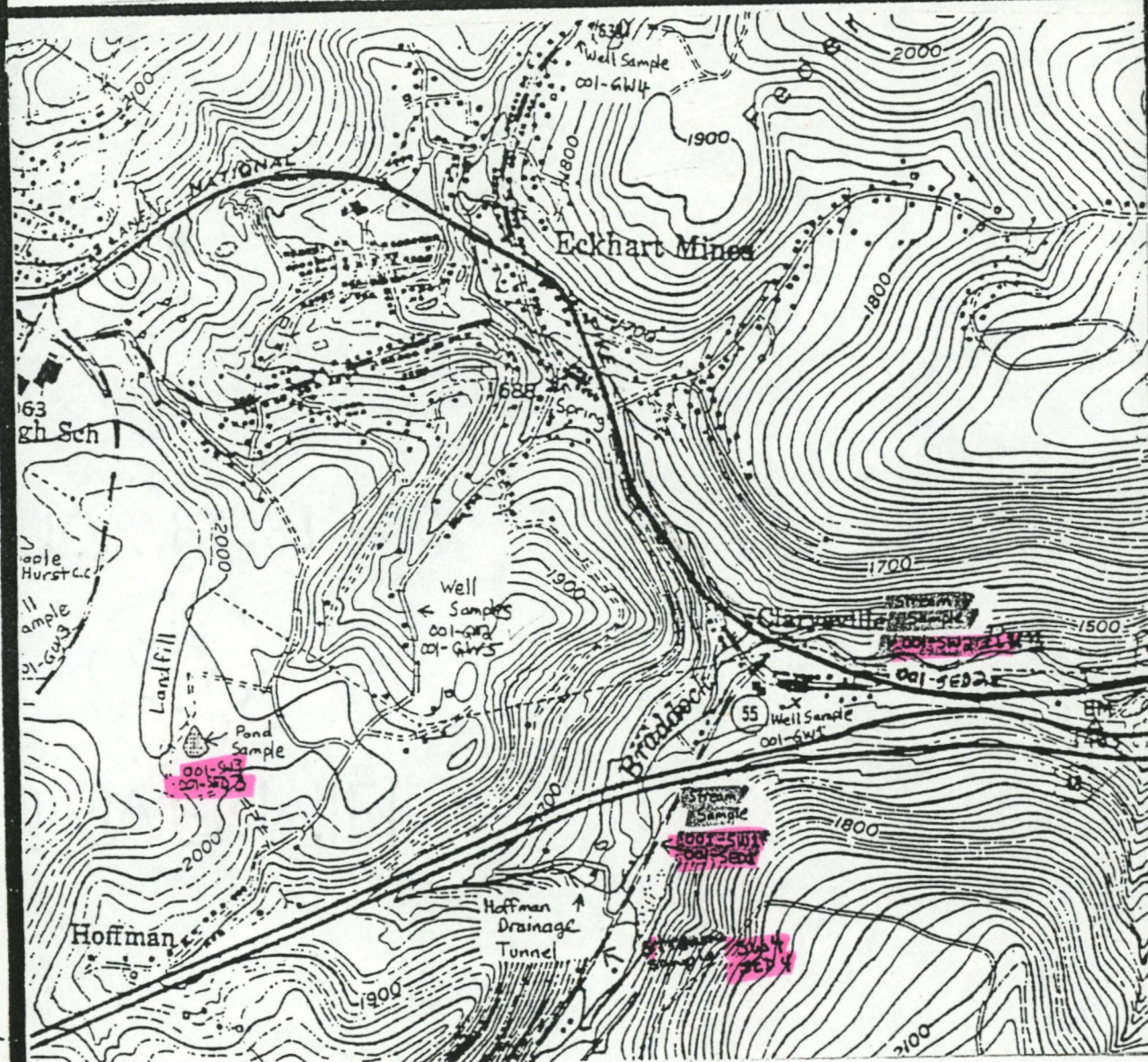
Figure 9



ORIGINAL  
(Red)

# Location of Surface Water Samples

Figure 10

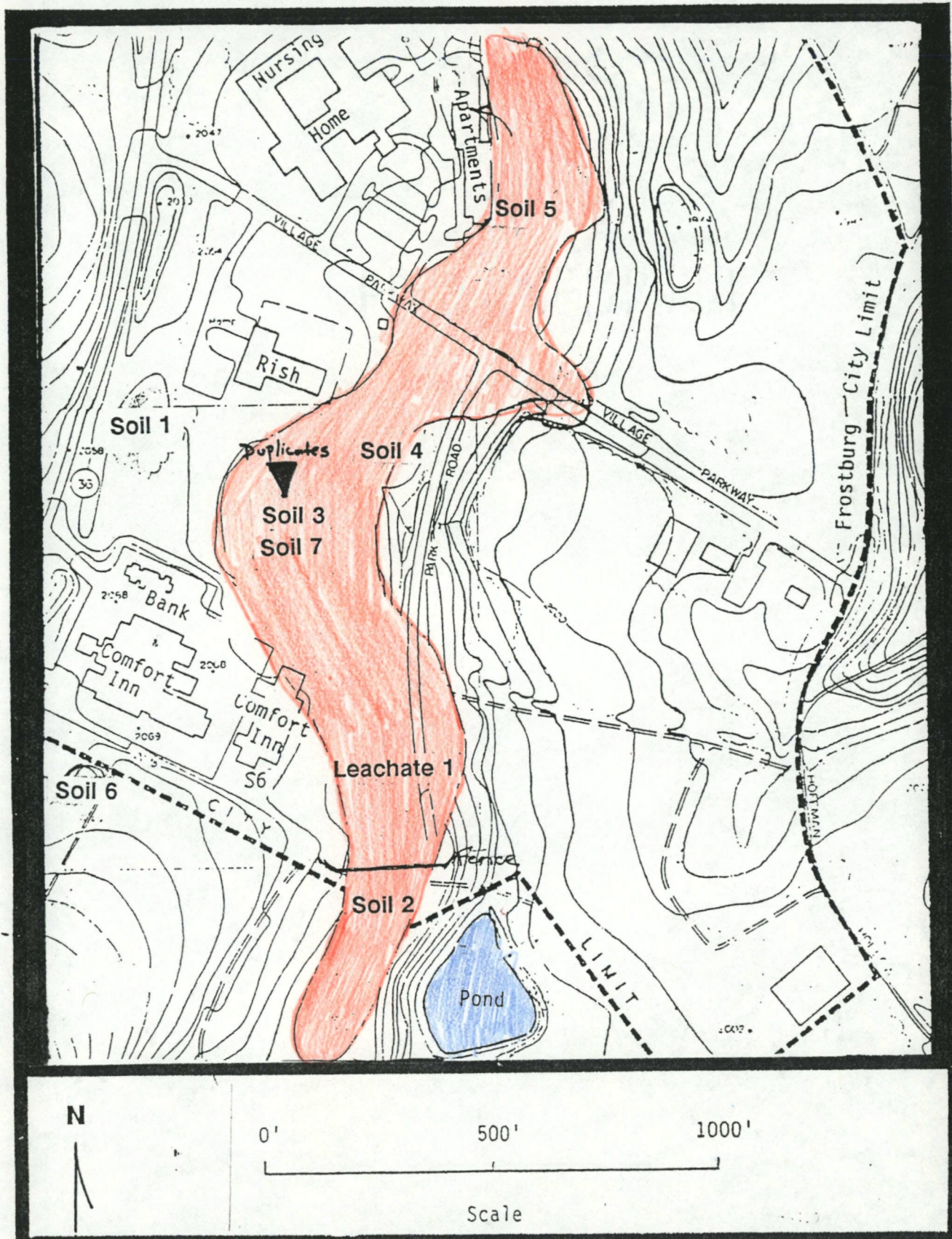


N

Fig 1

Scale 1"=2540'

ORIGINAL  
(Red)



ORIGINAL  
(Red)

**Appendix I**  
**Rules of Operation at Allegany County's Landfill Projects**

WELCOME TO ALLEGANY COUNTY LANDFILL NO. 2

The following rules of operation are necessary for the efficient operation of this landfill project. Your cooperation in abiding by these rules is greatly appreciated.

Rules of Operation

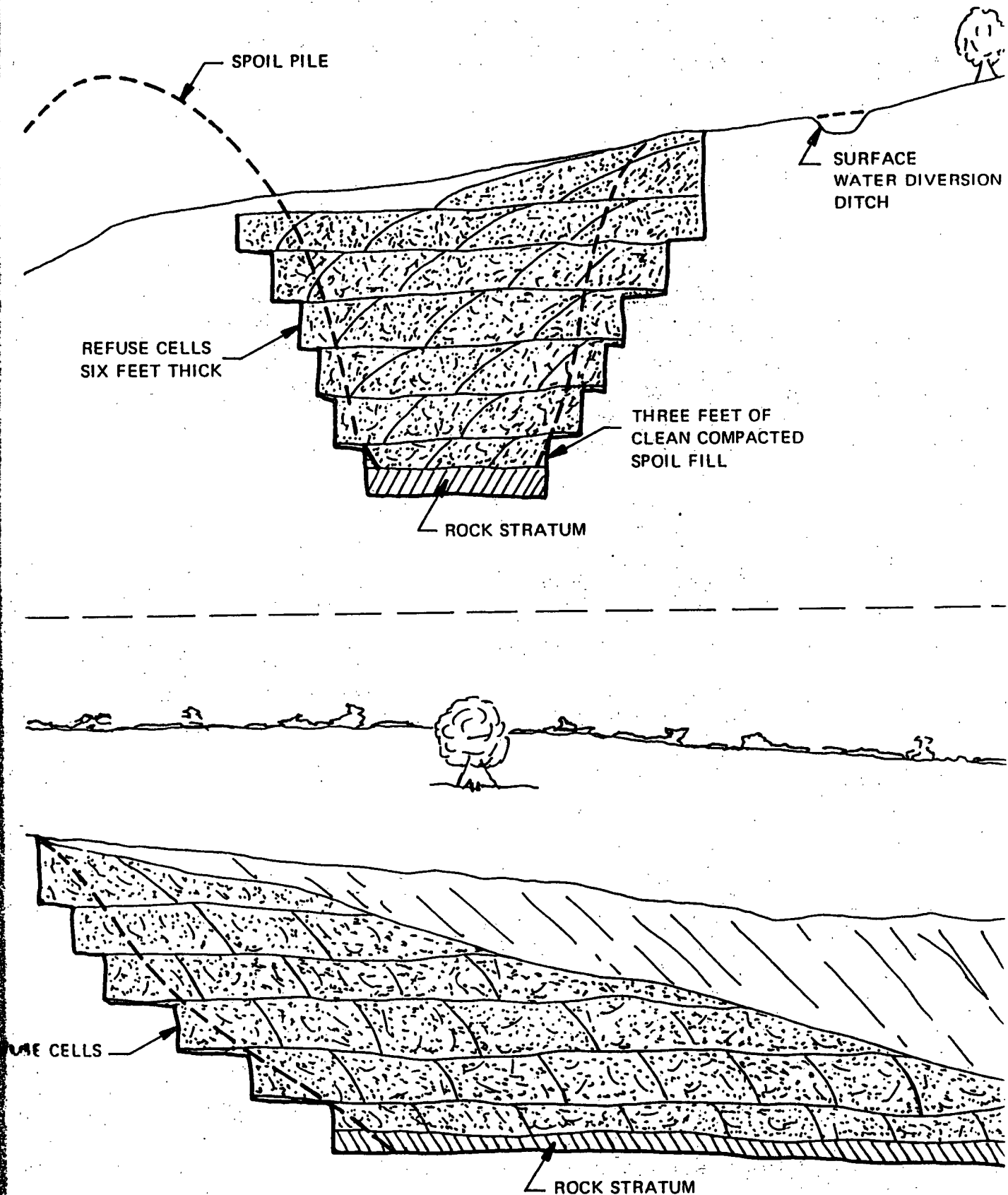
- 1) State laws require that all vehicles hauling materials that would be blown and/or fall upon a highway must be properly covered.
- 2) OBEY posted speed limits.
- 3) The Allegany County Landfill Project assumes no responsibility for accidents. Travel at your own risk on all roads leading to the landfill as well as the landfill site itself.
- 4) Cars and station wagons with small amounts of refuse please check with the scale operator.
- 5) NO HOT ASHES or burning material accepted.
- 6) NO FIREARMS or hunting permitted on the landfill property.
- 7) No scavenging or salvage operations permitted.
- 8) No trespassing after operating hours.
- 9) Refuse must be placed at the point designated by landfill personnel.
- 10) Prohibited items:
  - (a) Motor vehicles or large portions thereof
  - (b) Large stumps or tree limbs
  - (c) Explosive materials or hazardous materials
- 11) Permits are required for non-county residents.

ORIGINAL  
(Red)

**Appendix II**  
**Cross Sections of Mine Pit Filling Operation**

**FIGURE NUMBER 3**  
**CROSS SECTIONS OF MINE PIT**  
**FILLING OPERATION**

21 ORIGINAL  
(Red)



ORIGINAL  
(Red)

**Appendix III**  
**Geology and Hydrology at the Hoffman Landfill**

GEOLOGY AND HYDROLOGY OF THE FROSTBURG SANITARY LANDFILL  
SITE NUMBER I  
ALLEGANY COUNTY, MARYLAND

I. Introduction

Specially designed observation wells were installed at the Frostburg landfill site to aid in sample collection, and to observe, measure, and test a variety of characteristics related to the geology and hydrology of sanitary landfills placed in old strip mines. Two basic well types were installed: one type on the surface of the landfill penetrating all layers of previously compacted and covered trash, and the other adjacent to the landfill in a geologic downdip position penetrating undisturbed strata. The two basic areas for well locations were designed for essentially independent objectives and methods of data collection, but as the research progressed, overlap occurred in the areas of data presentation.

Both types of wells aided in carrying out the following activities:

1. The measurement of ground water and/or leachate level fluctuations.
2. The measurement of air and water temperatures inside each well.
3. The observation of liquid flow patterns by means of tracers.
4. The sampling of gases and liquids for laboratory analysis.

Additionally, the wells on the landfill were fitted at the ground surface with moveable concrete collars which allowed for the measurement of the percent of landfill settlement.

II. Well Installation

- A. Groundwater Observation Well (Figure No. 4 )

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(Red)

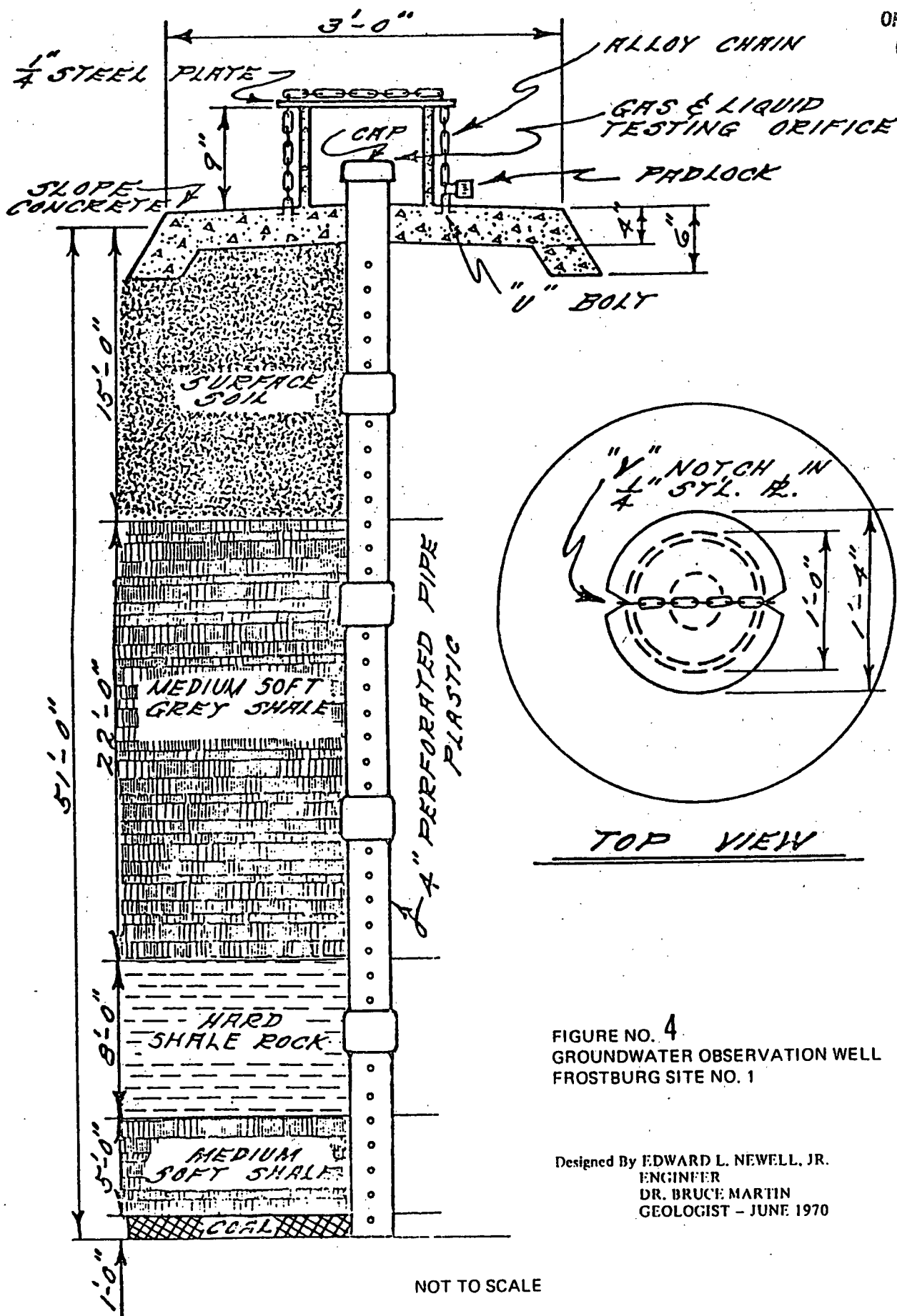


FIGURE NO. 4  
GROUNDWATER OBSERVATION WELL  
FROSTBURG SITE NO. 1

Designed By EDWARD L. NEWELL, JR.  
ENGINEER  
DR. BRUCE MARTIN  
GEOLOGIST - JUNE 1970

NOT TO SCALE

1. Drilling

Ten observation wells were drilled on May 14, 1970, (Figure No.5 ). These wells ranging in depth from 51 feet to 86 feet were drilled to the top of the Tyson coal seam for which the coal was removed in the strip mine. (Figure No.6 ). Wells 1 through 8 were placed as close to the filled pit as possible and penetrated complete geologic sections; wells 9 and 10 were located to facilitate observations of ground water levels and movement away from the pit. Water was encountered in all ten wells at the time of drilling.

2. Well Construction

a. The wells were drilled into the coal seam, but not through it.

b. The holes were cased with four inch diameter perforated PVC (polyvinylchloride) pipe with 10, one-half inch openings per foot of pipe. These perforations permitted free water flow into the wells.

c. Concrete collars surrounded the casings at ground level to prevent surface water from entering the wells. Removeable plastic caps covered the tops of the casings. For additional protection against vandalism, locked steel covers protected the well caps and concrete collars.

c. Signs marked the sites of the wells to aid in their location in case they were obscured by high grass or snow.

e. Bench marks were established on wells 2, 3 and 5 to facilitate in the determination of changing elevations on landfill observation wells A, B and C, owing to landfill settlement.

ORIGINAL  
(Red)

**Appendix IV**  
**Summary and Data Tables from the Water Sampling**  
**Program at the Hoffman Landfill**

## WATER SAMPLING PROGRAM

\* As mentioned previously, a program was conducted during the period 1966 through 1969 to collect water samples from private wells and surface sources to obtain background information and to determine possible changes in the physical and chemical qualities as a result of the Frostburg and Westernport landfill operations. The results of the laboratory examination of these samples showed no significant changes or harmful effects. The findings of these tests are summarized in Table 4.

\* In addition, a similar testing program was instituted to monitor the quality of the water in the ten groundwater observation wells at the Frostburg site. The results of the determinations for pH, total residue, volatile residue, chlorides, oxygen demand, total iron, and hardness are shown in Table 5.

\* The variety of microorganisms isolated from the samples from the groundwater wells was initially surprising. However, on consideration it was determined that these organisms were not uncommon to the general soli-water environments.

Some organisms were plated out as facultative anaerobes but could not be isolated in pure culture. It is possible that these could be anaerobes functioning as aerobes under the influence of some dissolved oxygen in the groundwater.

Organisms isolated and identified do not exclude the presence of others, but may very well represent those most easily isolated. Slower growing organisms may well have been obliterated by more rapidly growing ones.

The microbiological flora present may only be representative of the season of the year and the conditions at the time of sampling. It is difficult to speculate as to the products of metabolism, that may be representative of certain genera of organisms, which would limit proliferation of other organisms or create toxic conditions for the general flourishing at a given time. A summary of the laboratory findings is included in Table No. 6.

\* As a matter of general interest, ambient air temperature, temperatures inside the well casings and liquid levels were recorded for landfill observation wells A, B, and C, and groundwater well No. 1. These data are shown in Table No. 7.

\* As described earlier, the landfill wells were fitted with gas sampling devices to permit collection of specimens for determination of methane, CO<sub>2</sub>, H<sub>2</sub>S, Ammonia, and other gases. The results of the examination of these samples are shown in Table No. 8.

\* The possible presences of herbicides and pesticides in leachates collected from the landfill observation wells was investigated by the use of standard chromatographic techniques. However, their presence was not confirmed. It was noted that because of the high concentrations of greases and oils in the samples, along with a high color, it was not possible to prepare these samples properly for the testing procedures. See Table No. 9 for results.

\* Tests were carried out for heavy metals on samples of leachates from the landfill observation wells. It was found that mercury, lead, and cadmium were absent and that the concentration of copper, zinc, and nickel, were about the same as those observed in samples from the groundwater wells. See Table No. 10.

\* Although boron compounds were used as tracers for determining the movement of leachates from the sanitary landfill to the groundwater observation wells, positive proof of their effectiveness as water movement indicators cannot be unquestionably stated at this time. The absence of boron in the ground water samples seems to verify a lack of sanitary landfill-groundwater interaction since boron compounds were seeded into the landfill observation wells.

There was no evidence in these preliminary findings that was an interchange of pollutants between the Frostburg sanitary landfill and the adjacent groundwater observation wells.

PRELIMINARY WATER SAMPLING PROGRAM  
FROSTBURG SITE NO. 1 & WESTERNPORT SITE NO. 2  
RESULTS OF LABORATORY EXAMINATIONS

Date	Source	pH	Nonfiltrable residue	Volatile residue	Nitrite	Nitrate	Dissolved oxygen	Oxygen demand (biochemical)	Phosphate	Filtrable residue	Color	Turbidity	Chloride	Nitrogen	Albuminoid	Ammonia	Total residue	Alkalinity (Ca CO <sub>3</sub> )	Hardness (Ca CO <sub>3</sub> )	Iron	Silica	Aluminum	Calcium	Magnesium	Manganese	Carbonate	Sulfate	Fluoride	Carbonate stability	pH	Alkalinity	Copper	Lead	Sodium	ABS (Alkyl benzene sulfonate)
		mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	UNITS	UNITS	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32				
2/20/67	LP-1	4.3	—	—	—	—	—	—	—	122	3	3	4	—	—	—	120	103	97	0.0	6.0	.02	40	6.4	0.0	20	12	0.1	—	—	—	0.0	.002	—	—
3/16/67	LP-1	7.0	6.0	—	.008	.7	9.5	.4	.14	186	3	3	4	.04	—	—	202	128	118	0.1	5.8	.02	47	12	0.0	—	22	0.0	7.7	68	0.0	.001	—	—	
3/21/67	LP-1	—	2	—	.001	.30	8.1	.8	.25	270	5	2.7	2.2	—	—	—	272	182	240	—	9.0	.05	158	82	1.5	—	23	0.1	—	—	0.1	.01	—	—	
11/7/67	LP-1	7.8	—	—	—	2.4	—	—	—	—	25	10	3.5	—	—	—	154	125	106	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1/15/68	LP-1	7.9	—	—	—	1.1	—	—	—	—	5	3	3.0	—	—	—	—	90	93	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4/2/68	LP-1	7.9	—	—	—	.06	—	—	—	—	3	3	5.0	—	—	—	266	189	207	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7/2/68	LP-1	7.6	—	—	—	1.0	—	—	—	—	3	5	7.5	—	—	—	260	184	192	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	0.0	
10/68	LP-1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2/3/69	LP-1	2.7	2.0	—	—	.24	—	—	.12	—	10	5	273	—	—	—	244	270	88	0.1	6.8	.076	40	4.5	0.0	—	9.4	0.1	6.7	140	.025	.021	1.5	0.1	
4/30/69	LP-1	6.7	—	—	—	.60	—	—	—	—	3	3	9	—	—	—	224	126	151	0.1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
8/14/69	LP-1	7.8	—	—	—	1.6	—	—	—	—	7	5	3.8	—	—	—	144	101	95	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10/24/69	LP-1	7.4	—	—	—	1.8	—	—	—	—	3	3	4.3	—	—	—	104	87	85	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2/4/70	LP-1	7.5	—	—	—	1.5	—	—	—	—	8	3	17	—	—	—	256	125	149	0.70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
5/4/70	LP-1	7.1	—	—	—	.06	—	—	—	—	3	3	1.8	—	—	—	340	231	270	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7/8/70	LP-1	7.6	—	—	—	3.4	—	—	—	—	3	2	1.0	—	—	—	150	99	113	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2/26/71	LP-1	7.0	—	—	—	.06	—	—	—	—	3	2.5	15	—	—	—	338	239	246	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	2.0	
1/15/68	LP-2	6.1	—	—	1.9	—	—	—	—	—	70	30	2.5	—	—	—	754	33	438	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4/2/68	LP-2	6.4	—	—	.16	—	—	—	—	—	5	32	3.0	—	—	—	834	44	401	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7/8/68	LP-2	6.8	—	—	.04	—	—	—	—	—	3	5	8.5	—	—	—	920	33	406	0	—	—	—	—	—	—	—	—	—	—	—	—	—	6.5	
10/68	LP-2	6.7	—	—	.60	—	—	—	—	—	25	30	11	—	—	—	866	27	417	.7	—	—	—	—	—	—	—	—	—	—	—	—	—	3.5	
2/3/69	LP-2	2.7	1.0	—	.08	—	—	—	.14	—	5	3	208	—	—	—	740	236	447	7	1.3	.47	12.4	35	2.6	0	385	.4	7.2	102	0	.005	7.5	0.1	
4/30/69	LP-2	6.6	—	—	.50	—	—	—	—	—	3	10	13	—	—	—	684	29	399	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
9/18/69	LP-2	—	—	—	—	0.6	—	—	—	—	90	40	19	—	—	—	806	31	443	2.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10/2/69	LP-2	6.1	—	—	—	0.10	—	—	—	—	8	20	5.0	—	—	—	766	2.9	422	8.0	—	—	—	—	—	—	—	—	—	—	—	—	—	6.0	
2/2/70	LP-2	5.7	—	—	—	0.60	—	—	—	—	17	28	8.5	—	—	—	840	9.6	448	7.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4/30/70	LP-2	6.5	—	—	—	1.7	—	—	—	—	50	30	14	—	—	—	970	86	439	5.0	—	—	—	—	—	—	—	—	—	—	—	—	—	5.7	
7/8/70	LP-2	6.8	—	—	—	0.10	—	—	—	—	96	53	1.5	—	—	—	1040	29	569	9.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2/26/71	LP-2	6.2	—	—	—	0.20	—	—	—	—	15	77	15	—	—	—	732	48	420	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6.5	
2/20/67	LP-3	7.6	—	—	—	.08	—	—	—	102	70	7	5.5	—	—	—	6	96	29	42	1.0	.9	0.0	16	5	.4	0.0	38	.3	8.0	35	.2	.0081	—	—
3/16/67	LP-3	—	22	—	.012	.40	10.0	3.2	.06	94	50	15	5.0	.19	0	116	22	26	1.2	3.8	.02	16	5	.3	0.0	37	.3	8.3	19	0.0	.001	—	—		
3/21/67	LP-3	—	26	—	.0005	.08	1.3	3.8	.20	94	45	16	0.5	—	2	120	23	—	—	—	3	.15	34	—	.3	0.0	37	.3	—	—	<.1	<.01	—	—	
4/19/67	LP-3	7.5	17	—	.007	.40	0.4	2.7	.03	122	53	7	5.0	.22	—	—	126	32	49	1.4	4.4	0.0	17	5.7	.25	0.0	47	.2	8.2	45	.05	.005	—	—	
11/7/67	LP-3	6.9	—	—	—	.80	—	—	—	—	25	30	4.8	—	—	—	100	38	53	1.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1/15/68	LP-3	7.2	—	—	—	1.1	—	—	—	—	70	15	4.5	—	—	—	104	46	45	1.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4/2/68	LP-3	7.3	—	—	—	.19	—	—	—	—	30	5	2.0	—	—	—	118	28	44	.6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7/2/68	LP-3	7.2	—	—	—	.30	—	—	—	—	90	25	7.3	—	—	—	124	51	38	9.0	—	—	—	—	—	—	—	—	—	—	—	—	—	4.0	
10/68	LP-3	7.1	—	—	—	.04	—	—	—	—	30	7	8.0	—	—	—	109	58	72	.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10/68	LP-3	7.8	—	—	—	0.0	—	—	—	—	25	10	6.5	—	—	—	116	57	62	.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2/3/69	LP-3	3.0	14	—	—	0.14	—	—	0.0	—	10	18	176	—	—	—	178	167	71	.3	7.6	0.14	15	15	.55	0.0	29	0.2	7.5	98	.125	.006	1.0	0.1	
4/30/69	LP-3	7.3	—	—	—	0.20	—	—	—	—	40	15	6	—	—	—	102	30	42	2.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10/21/69	LP-3	7.5	—	—	—	0.10	—	—	—	—	35	15	7.5	—	—	—	90	29	42	0.60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
4/30/70	LP-3	7.0	—	—	—	0.14	—	—	—	—	20	10	11	—	—	—	98	27	55	0.40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7/8/70	LP-3	8.4	—	—	—	0.12	—	—	—	—	45	4.5	1.0	—	—	—	130	46	62	0.80	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2/26/71	LP-4	6.5	—	—	—	0.15	—	—	—	—	40	23	15	—	—	—	150	18	66	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	4.5	
4/30/69	LP-4	6.4	—	—	—	—	—	—	—	—	60	25	—	—	—	—	128	21	67	1.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10/24/69	LP-4	7.0	—	—	—	—	—	—	—	—	25	10	—	—	—	—	86	30	41	0.20	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
8/24/69	LP-4	7.2	—	—	—	7.2	—	—	—	—	40	12	—	—	—	—	92	39	53	0.30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
1/13/70	LP-4	7.1	—	—	—	—	—	—	—	—	18	5	—	—	—	—	138	29	52	0.30	—	—	—	—											

**TABLE NO. 4**  
**PRELIMINARY WATER SAMPLING PROGRAM**  
**FROSTBURG SITE NO. 1 & WESTERNPORT SITE NO. 2**  
**RESULTS OF LABORATORY EXAMINATIONS**

Date	Source	pH	Nonfiltrable residue	Volatile residue	Nitrite	Nitrate	Dissolved oxygen	Oxygen demand (biochemical)	Phosphate	Filtrable residue	Color	Turbidity	Chloride	Nitrogen	Albuminoid	Ammonia	Total residue	Alkalinity (Ca CO <sub>3</sub> )	Hardness (Ca CO <sub>3</sub> )	Iron	Silica	Aluminum	Calcium	Magnesium	Manganese	Carbonate	Sulfate	Fluoride	Carbonate stability	pH	Alkalinity	Copper	Lead	Sodium	ABS (Alkyl benzene sulfonate)	
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27		28		29	30	31	32			
3/16/67	LP-6	7.1	11	—	.016	.70	10.6	—	.05	224	20	10	6.0	.652	.004	248	17	106	0.3	6.9	.01	25	22	.10	0.0	105	0.1	7.7	29	0.0	.005	—	—	—	—	
3/21/67	LP-6	—	4	—	.003	.50	12.6	1.9	.17	204	15	12	0.3	—	—	208	—	134	0.2	5.0	.05	5.4	80	.90	—	53	0.3	—	—	—	—	—	—	—	—	
11/7/67	LP-6	3.7	—	—	.10	—	—	—	—	—	25	30	—	—	—	1562	94	444	50.	—	—	—	—	—	—	—	—	—	7.2	79	.28	.01	—	—	—	
1/15/68	LP-6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
2/2/68	LP-6	7.1	—	—	—	1.2	—	—	—	—	10	28	71	—	—	1238	397	160	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
7/2/68	LP-6	7.9	—	—	—	.30	—	—	—	—	50	190	52	—	—	1146	521	288	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	
10/68	LP-6	7.7	—	—	.10	—	—	—	—	—	70	36	82	—	—	702	248	176	10	—	—	—	—	—	—	—	—	—	7.6	448	—	—	—	—	—	
2/3/69	LP-6	4.7	58	—	—	—	—	—	1.64	—	60	25	307	—	—	3162	210	324	75	26	2.2	284	82	0.0	0.0	337	1.0	6.0	369	.05	.14	186	—	—	—	
4/30/69	LP-6	5.8	—	—	—	3.0	—	—	—	—	120	100	341	—	—	7058	1975	2310	200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/24/69	LP-6	7.1	—	—	—	0.3	—	—	—	—	110	300	23	—	—	37414	2303	1513	2250	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4/30/70	LP-6	5.3	—	—	—	3.0	—	—	—	—	400	112	192	—	—	3316	594	0.0	100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/20/67	LP-7	6.9	—	—	.04	—	—	—	—	278	12	5	10	—	—	4.0	272	171	204	1.0	7.7	0.0	61	18	0.35	0.0	52	0.3	7.6	162	0.0	.005	—	—	—	—
3/16/67	LP-7	6.9	12	—	.012	.08	8.4	2	.03	336	5	3	9	.026	.180	352	184	212	1.5	5.5	.03	77	21	0.4	0.0	78	0.1	7.4	190	0.02	.004	—	—	—	—	
3/21/67	LP-7	2	—	—	.0015	.08	1.3	4.2	.17	—	15	7.0	4.0	—	—	2	340	—	280	—	9	.05	180	100	0.75	—	44	0.2	—	—	<0.1	<.01	—	—	—	—
9/19/67	LP-7	6.8	90	—	.008	0.6	5.4	—	0.0	270	3	7	5.3	.032	.144	266	158	190	.90	8.0	.03	59	16	—	—	—	—	0.0	34	0.2	7.4	167	0.0	.004	—	—
11/7/67	LP-7	7.0	—	—	.08	—	—	—	—	—	7	7	10	—	—	266	165	205	1.2	—	—	—	—	—	—	—	—	—	7.4	155	0.0	—	—	—	—	—
1/15/68	LP-7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4/2/68	LP-7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/2/68	LP-7	6.9	—	—	—	.10	—	—	—	—	12	5	9.5	—	—	274	150	190	2.2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/68	LP-7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7.5	155	—	—	—	—	—	—
2/3/69	LP-7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4/30/69	LP-7	5.8	—	—	—	3.0	—	—	—	—	120	100	341	—	—	7058	1975	2310	200	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/3/69	LP-8	2.8	0.0	—	.16	—	—	—	.33	3	3	3	309	—	—	564	.177	238	3.0	7.2	.27	112	18	.65	0.0	61	.3	6.8	119	0.0	0.0	2.3	0.1	—	—	—
4/30/69	LP-8	7.1	—	—	.40	—	—	—	—	3	3	5	7.3	—	—	258	186	202	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/24/69	LP-8	7.4	—	—	1.8	—	—	—	—	3	3	3	4.3	—	—	104	87	85	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/31/69	LP-8	7.2	—	—	0.04	—	—	—	—	10	25	9.3	—	—	—	256	200	227	2.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4/30/70	LP-8	7.3	—	—	0.30	—	—	—	—	15	10	11	—	—	—	242	194	218	2.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/26/71	LP-8	7.3	—	—	0.28	—	—	—	—	15	2.3	11	—	—	—	256	193	207	1.5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6/5/68	LP-12/7.3	—	—	—	0.8	—	—	—	—	7	15	4.5	—	—	—	276	98	153	.30	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/8/68	LP-12/7.3	—	—	—	2.0	—	—	—	—	10	5	5.5	—	—	—	252	100	139	1.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/3/69	LP-12/3.1	50	—	—	2.0	—	—	—	.08	5	10	179	—	—	—	348	.117	176	.10	11	.13	60	12	0.0	0.0	68	0.2	7.3	104	.10	0.0	4.0	<0.1	—	—	
4/30/69	LP-12/7.2	—	—	—	1.1	—	—	—	—	5	3	6.3	—	—	—	282	106	165	—	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8/14/69	LP-12/7.0	—	—	—	—	—	—	—	—	25	25	—	—	—	—	522	108	174	.50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/23/69	LP-12/6.7	—	—	—	1.4	—	—	—	—	5	3	5.8	—	—	—	336	136	224	.70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
1/15/70	LP-12/7.4	—	—	—	—	—	—	—	—	3	3	—	—	—	—	304	168	183	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
4/30/70	LP-12/7.2	—	—	—	.06	—	—	—	—	45	30	11	—	—	—	246	95	167	.4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/8/70	LP-12/7.0	—	—	—	—	—	—	—	—	5	1	—	—	—	—	368	102	194	0.0	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/20/67	LP-13/7.0	—	—	—	.04	—	—	—	—	3	5	3.5	—	—	—	664	24	422	.40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/3/68	LP-13/3.8	—	—	—	0.0	—	—	—	—	7	20	5.8	—	—	—	2192	.53	902	.14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/3/69	LP-13/2.6	120	—	—	.10	—	—	—	1.0	30	97	270	—	—	—	3026	.562	1600	.75	101	.14	480	115	8.0	0.0	1607	0.5	7.4	53	—	—	—	—	—	—	
4/30/69	LP-13/2.9	—	—	—	.16	—	—	—	—	7	45	8.0	—	—	—	3076	.78	1580	.25	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/2/70	LP-13/2.9	—	—	—	.04	—	—	—	—	48	300	13	—	—	—	3816	428	854	110	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/8/70	LP-13/6.4	—	—	—	.30	—	—	—	—	520	58	3.5	—	—	—	1652	552	327	.35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8/14/70	LP-12/3.4	—	—	—	.20	—	—	—	—	120	80	11	—	—	—	3362	.95	430	600	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/20/67	LP-14/2.9	—	—	—	.10	—	—	—	—	20	65	5.3	—	—	—	3512	.318	437	120	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7/8/68	LP-14/3.3	—	—	—	.60	—	—	—	—	12	1000	9.0	—	—	—	7028	.35	1594	.75	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10/8/68	LP-14/3.2	—	—	—	.04	—	—	—	—	20	7	6.3	—	—	—	3038	.148	221	.18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2/																																				



FROSTBURG SITE NUMBER 1  
RESULTS OF LABORATORY EXAMINATIONS

DATE	TEST WELL NUMBER	LABORATORY NUMBER	DEPTH TO WATER	pH	TOTAL RESIDUE mg/l	VOLATILE RESIDUE mg/l	CHLORIDES mg/l	OXYGEN DEMAND (BIOCHEMICAL) mg/l	TOTAL IRON mg/l	HARDNESS mg/l
17 Jun 71	1	WML 7127		6.0	533	381				
7 July 71	1	WMA 7202	52'	6.2	552	361	10	35.5	30	370
10 Aug 71	1	WMB 7209	53'	6.4	438	153	23	720.0	26	300
15 Sep 71	1	WMC 7214	52'	6.4	397	104	10		26	35
14 Oct 71	1	WMD 7208	54'	7.0	299	126	26	4.0	14	200
17 Jun 71	2	WML 7127		5.6	218	149		4.2	10.5	200
7 Jul 71	2	WMA 7202	53'	5.4	372	285	11	9.6	6	220
10 Aug 71	2	WMB 7209	56'	5.7	561	89	10	7.8	2.8	175
15 Sep 71	2	WMC 7214	55'	6.0	298	69	12		7.1	195
14 Oct 71	2	WMD 7208	53'	6.4	239	94	12	5.0	.75	225
17 Jun 71	3	WML 7127		5.3	357	276		5.4	1.5	250
7 Jul 71	3	WMA 7202	64'	5.2	272	200	11	4.8	18	60
10 Aug 71	3	WMB 7209	66'	5.7	416	73	13	5.4	0.6	110
15 Sep 71	3	WMC 7214	67'	6.0	2184	51	14		6.1	125
14 Oct 71	3	WMD 7208	66'	6.6	292	109	10	2	1.5	180
17 Jun 71	4	WML 7127	Dry					725	1.5	225
7 Jul 71	4	WMA 7202	Dry							
10 Aug 71	4	WMB 7209	Dry							
15 Sep 71	4	WMC 7214	Dry							
14 Oct 71	4	WMD 7208	Dry							
17 Jun 71	5	WML 7127		5.8	827	71				
7 Jul 71	5	WMA 7202	36'	5.6	412	348	5	11.4	26	100
10 Aug 71	5	WMB 7209	45'	6.0	651	83	10	6.6	9	150
15 Sep 71	5	WMC 7214	52'	6.1	337	65	12		31.5	170
14 Oct 71	5	WMD 7208	54'	6.8	1620	167	8	3.0	11.5	150
17 Jun 71	6	WML 7127		5.9	588	507		2.4	58.5	125
7 Jul 71	6	WMA 7202	42'	5.7	150	106	9	4.2	13.0	50
10 Aug 71	6	WMB 7210	45'	6.1	532	60	7	3.9	0.7	70
15 Sep 71	6	WMC 7213	48'	6.0	260	21	18		0.0	95
14 Oct 71	6	WMD 7209	53'	6.8	486	81	8	1	7.5	150
17 Jun 71	7	WML 7127		6.1	665	552	0	2.4	12	140
7 Jul 71	7	WMA 7202	21'	5.6	704	600	8	4.2	200	75
10 Aug 71	7	WMB 7210	28'	6.1	2220	232	8	5.4	190	110
15 Sep 71	7	WMC 7213	33'	6.1	386	30	10		140	60
14 Oct 71	7	WMD 7209	31'	6.9	1273	1143	10	3	180	100
17 Jun 71	8	WML 7127		5.2	242	196		2.4	320	130
7 Jul 71	8	WMA 7202	33'	5.2	215	171	8	1.2	16	50
10 Aug 71	8	WMB 7210	35'	5.9	806	49	8	3.9	2.1	75
15 Sep 71	8	WMC 7213	38'	6.1	176	31	11		54	75
14 Oct 71	8	WMD 7209	37'	6.5	964	889	10	2	9	170
17 Jun 71	9	WML 7127		4.7	717	629		2.4	16.5	75
7 Jul 71	9	WMA 7202	67'	4.9	241	180	8	4.2	16	40
10 Aug 71	9	WMB 7210	62'	5.1	786	57	6	4.8	1.3	25
15 Sep 71	9	WMC 7213	68'	5.7	351	35	11		24	55
14 Oct 71	9	WMD 7209	70'	6.0	356	226	10	3	11.5	100
17 Jun 71	10	WML 7127		6.1	1497	1315		3	6.5	130
7 Jul 71	10	WMA 7202	67'	6.3	447	349	7	13.8	12.0	220
10 Aug 71	10	WMB 7210	68'	6.6	399	62	8	4.8	1.4	145
15 Sep 71	10	WMC 7213	70'	6.4	347	77	12		5.9	160
14 Oct 71	10	WMD 7209	71'	6.7	462	262	8	3	4.5	175
								3	5	209

TABLE NO. 6  
MICROBIOLOGICAL STUDIES  
FROSTBURG SITE NO. 1  
MARCH 10, 1971

LABORATORY PROCEDURE	GROUNDWATER OBSERVATION WELL NO. 3	LANDFILL OBSERVATION WELL A
<u>COUNTS</u>		
Aerobic Plate Count	56,000/ml	8,000/ml
Aerobic Spore Count	3,100/ml	3,500/ml
Facultative Anaerobic and Aerobic Spore Count	2,800/ml	480/ml
MPN - Total Coliforms	150/100 ml	93/100 ml
MPN - Fecal Coliforms	0/100 ml	0/100 ml
Fungus Count	850/ml	320/ml
<u>ISOLATIONS</u>		
Fungi	Penicillium Mucor Rhizopus Aspergillus niger	Mucor Actinomycetes
Aerobic Spore Formers	Bacillus megaterium Bacillus cereus Mycoides (various)	Bacillus subtilis Bacillus cereus Mycoides (various)
Other Aerobic Organisms (Gram Negative)	Enterobacter aerogenes Enterobacter cloacal Alcaligenes faecalis	Absent
Anaerobes	Absent	Clostridium tertium Clostridium sporogenes

TABLE NO. 7  
TEMPERATURE AND LEACHATE LEVEL DATA  
OBSERVATION WELLS  
FROSTBURG SITE NO. 1

Date	Well Identification	Ambient Air Temperature	Temperature in Well Casing (30' Below Surface)	Leachate Depth (feet)
Aug 30, 1970	<u>Landfill Well A</u>	-	-	3.0
Nov 4, 1970	do.	36°F	65°F	4.0
Nov 28, 1970	do.	40°F	60°F	-
Dec 4, 1970	do.	39°F	57°F	1.0
Jan 6, 1971	do.	10°F	55°F	-
Feb 8, 1971	do.	26°F	57°F	-
Aug 18, 1971	do.	-	-	dry
Aug 30, 1970	<u>Landfill Well B</u>	-	-	dry
Nov 4, 1970	do.	36°F	68°F	8.0
Nov 28, 1970	do.	40°F	63°F	-
Dec 4, 1970	do.	39°F	61°F	6.4
Jan 6, 1970	do.	10°F	59°F	-
Feb 8, 1970	do.	26°F	59°F	-
Aug 18, 1971	do.	-	-	1.0
Aug 30, 1970	<u>Landfill Well C</u>	-	-	dry
Nov 4, 1970	do.	36°F	59°F	dry
Nov 28, 1970	do.	40°F	52°F	-
Dec 4, 1970	do.	39°F	46°F	2.3
Jan 6, 1970	do.	10°F	43°F	-
Feb 8, 1970	do.	26°F	44°F	-
Aug 18, 1971	do.	-	-	dry
Aug 30, 1970	<u>Groundwater Well-1</u>	-	-	-
Nov 4, 1970	do.	36°F	51°F*	-
Nov 28, 1970	do.	40°F	52°F*	-
Dec 4, 1970	do.	-	-	-
Jan 6, 1970	do.	-	-	-
Feb 8, 1970	do.	-	-	-
Aug 18, 1971	do.	-	-	-

\* Temperature was measured 20 feet below surface instead of 30 feet.

ORIGINAL  
(Red)

TABLE NUMBER 8  
FROSTBURG SITE NUMBER 1  
RESULTS OF LABORATORY EXAMINATIONS  
GAS SAMPLES FROM OBSERVATION WELLS

DATE	SOURCE	METHANE (percent)	CARBON DIOXIDE (percent)	HYDROGEN SULFIDE (percent)	AMMONIA (percent)	OTHER (percent)
5 Oct 71	Observation Well A	53%	27%	Not Detected	Not Detected	Not Detected
12 Oct 71	"	48%	28%	Not Detected	Not Detected	Not Detected
19 Oct 71	"	55%	31%	"	"	"
27 Oct 71	"	55%	28%	"	"	"
2 Nov 71	"	56%	27%	"	"	"
9 Nov 71	"	52%	27%	"	"	"
16 Nov 71	"	56%	24%	"	"	"
22 Nov 71	"	49%	26%	"	"	"
7 Dec 71	"	67%	28%	"	"	"
12 Jan 72	"	60%	28%	"	"	"
2 Feb 72	"	59%	24%	"	"	O <sub>2</sub> & N <sub>2</sub> Detected
18 Apr 72	"	56%	31%	"	"	O <sub>2</sub> & N <sub>2</sub> Detected
5 Oct 71	Observation Well B	56%	31%	Not Detected	Not Detected	Not Detected
12 Oct 71	"	58%	32%	"	"	"
19 Oct 71	"	48%	21%	"	"	"
27 Oct 71	"	57%	32%	"	"	"
2 Nov 71	"	43%	32%	"	"	"
9 Nov 71	"	58%	28%	"	"	"
16 Nov 71	"	56%	32%	"	"	"
22 Nov 71	"	64%	36%	"	"	"
7 Dec 71	"	61%	23%	"	"	"
12 Jan 72	"	62%	27%	"	"	"
2 Feb 72	"	47%	21%	"	"	O <sub>2</sub> & N <sub>2</sub> Detected
18 Apr 72	"	53%	30%	"	"	O <sub>2</sub> & N <sub>2</sub> Detected
5 Oct 71	Observation Well C	58%	30%	Not Detected	Not Detected	Not Detected
12 Oct 71	"	41%	22%	"	"	"
19 Oct 71	"	65%	29%	"	"	"
27 Oct 71	"	59%	31%	"	"	"
2 Nov 71	"	47%	32%	"	"	"
9 Nov 71	"	26%	15%	"	"	"
16 Nov 71	"	56%	30%	"	"	"
22 Nov 71	"	59%	31%	"	"	"
7 Dec 71	"	64%	29%	"	"	"
12 Jan 72	"	64%	28%	"	"	"
2 Feb 72	"	60%	25%	"	"	O <sub>2</sub> & N <sub>2</sub> Detected
18 Apr 72	"	57%	30%	"	"	O <sub>2</sub> & N <sub>2</sub> Detected

TABLE NO. 9

RESULTS OF LABORATORY EXAMINATION  
OF PESTICIDE AND HERBICIDE SAMPLESORIGINAL  
(Red)OBSERVATION WELLS  
FROSTBURG SITE NO. 1

WELL IDENTIFICATION	PESTICIDES Parts per billion (ppb)	HERBICIDE
GROUNDWATER WELL NO. 1 (1969 - 1971)	SULFUR - 3.3 p.p.b. (CTLC) DDT - 0.5 p.p.b. (NCTLC)	NEGATIVE
GROUNDWATER WELL NO. 2 (1969 - 1971)	SULFUR - 0.27 p.p.b. (CTLC) DDT - 0.41 p.p.b. (NCTLC)	NEGATIVE
GROUNDWATER WELL NO. 3 (1969 - 1971)	SULFUR - 1.2 p.p.b. (CTLC) DDT - 0.5 p.p.b. (NCTLC) DDD - 0.1 p.p.b. (NCTLC)	NEGATIVE
GROUNDWATER WELL NO. 4 (1969 - 1971)	SULFUR - 1.0 p.p.b. (CTLC) DDT - 0.34 p.p.b. (NCTLC)	NEGATIVE
GROUNDWATER WELL NO. 5 (1969 - 1971)	SULFUR - 0.6 p.p.b. (CTLC) Peak rf value - 2.6 (unidentified)	NEGATIVE
GROUNDWATER WELL NO. 6 (1969 - 1971)	SULFUR - 3.3 p.p.b. (CTLC) Peak rf value - 2.8 (unidentified)	NEGATIVE
GROUNDWATER WELL NO. 7 (1969 - 1971)	SULFUR - 0.08 p.p.b. (CTLC) DDT - 0.2 p.p.b. (NCTLC)	NEGATIVE
GROUNDWATER WELL NO. 8 (1969 - 1971)	SULFUR - 0.08 p.p.b. (CTLC) DDT - 0.2 p.p.b. (NCTLC)	NEGATIVE
GROUNDWATER WELL NO. 9 (1969 - 1971)	SULFUR - 0.36 p.p.b. (CTLC) Peak matched that of Atrazine - 0.32 p.p.b. DDT - 0.24 p.p.b. N/C Either DDT or Atrazine by TLC	NEGATIVE
GROUNDWATER WELL NO. 10 (1969 - 1971)	SULFUR - 0.2 p.p.b. (CTLC) Peak matched that of Atrazine 1.1 p.p.b. DDT - 0.32 p.p.b. - N/C DDT or Atrazine by TLC	NEGATIVE
INFILL OBSERVATION WELL A (sampled October 15, 1970)	NEGATIVE	NEGATIVE

C - Confirmed by thin Layer Chromatography  
 LC - Not confirmed by thin Layer Chromatography

TABLE NO. 10  
SUMMARY OF THE RESULTS OF THE  
CHEMICAL EXAMINATIONS OF WATER SAMPLES  
FROM THE GROUND WATER TEST WELLS  
FROSTBURG SITE NO. 1

*SUBSTANCE mg/l	GROUNDWATER TEST WELLS AT FROSTBURG										DISCUSSION OF LABORATORY RESULTS
	1	2	3	4	5	6	7	8	9	10	
Lead	.168	.467	.116	.190	.182	.214	.033	.080	.390	.040	In only two instances, wells 7 & 10, did the lead concentration fall within PHS standard of 0.05 mg/l
Cadmium	.003	.004	.004	.005	.009	.007	.003	.007	.009	.006	In all cases, the concentration of cadmium remained below the PHS standard of 0.01 mg/l
Copper	.021	.022	.022	.020	.019	.017	.023	.012	.024	.012	The concentrations of copper, in all test wells, were well below the PHS standard of 1.0 mg/l
Mercury Chromium Boron Phenol	--	--	--	--	--	--	--	--	--	--	ABSENT
Zinc	.043	.036	.023	.049	.043	.008	.030	.212	.040	.044	Concentrations of Zinc were well below the PHS standard of 5 mg/l
Nickel	.006	.000	.000	.009	.006	.004	.008	.000	.005	.006	The concentrations of Nickel in all wells were minimal but PHS standards are not available for comparison
Chlorides	1.20	0.34	3.10	3.70	1.10	1.10	1.70	0.80	0.60	0.60	The water in the test was practically free of chlorides. Total solids were quite high in all wells and in all but two instances exceeded the PHS standard of 500 mg/l
Suspended Residue	1246	265	476	437	5068	1295	3245	72	808	730	
Total Residue	1509	438	677	581	5320	1464	3988	185	1025	843	

\*All substances with the exception of chlorides, suspended residue and total residue, are reported as the result of one sample.

ORIGINAL  
(Red)

ORIGINAL  
(Red)

*Attachment I*



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
CENTRAL REGIONAL LABORATORY  
839 BESTGATE ROAD  
ANNAPOLIS, MARYLAND 21401-3013  
(410) 573 - 2799

ORIGINAL  
(Red)

DATE : October 13, 1992

SUBJECT : Region III Data QA Review

FROM : Cynthia E. Caporale *C. Caporale*  
Region III ESAT RPO (3ES31)

TO : Michael Taurino  
Regional Project Manager (3HW73)

Attached is the organic data validation report for the Hoffman Landfill Site (Case 18347) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me.

Attachment

cc: Jennifer Woods, MD DOE  
Edward Kantor, EMSL-LV  
Regional CLP TPO: Tom Bennett

Region: IV Lab Code: COMPU

TID File: 03920418 Task 1514

revised 03/91

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Environmental Services Assistance Teams  
Region 3

1419 Forest Drive, Suite 104  
Annapolis, Maryland 21403

ORIGINAL

DATE: October 1, 1992

SUBJECT: Organic Data Validation For Case 18347  
Site: Hoffman Landfill

FROM: Hari Prasad                      Mahboobeh Mecanic  
Organic Data Reviewer              Senior Oversight Chemist

TO: Cynthia E. Caporale  
ESAT Regional Project Officer

THROUGH: Dale S. Boshart  
ESAT Team Manager

#### OVERVIEW

Case 18347 consisted of twelve (12) aqueous and eleven (11) soil samples submitted to Compuchem Laboratories, Inc. for volatile, semivolatile and pesticide/PCB analyses. The aqueous samples included one (1) field duplicate pair and one (1) field blank and the soil samples included one (1) field duplicate pair. The samples were analyzed as a Contract Laboratory Program (CLP) Routine Analytical Service (RAS).

#### SUMMARY

The samples were successfully analyzed for all target compounds except a few compounds in the semivolatile fraction. All other instrument and method sensitivities were according to the Contract Laboratory Program (CLP) Routine Analytical Service (RAS) protocol.

#### MAJOR PROBLEMS

- o In the semivolatile analyses, 3-nitroaniline had a relative response factor (RRF) less than 0.05 (< 0.05) in the initial calibration dated 6/15/92. The quantitation limits for this compound in the affected samples were qualified unusable ("R"). (See Table I in Appendix F.)
- o In the semivolatile analyses, sample CKY32 had the recovery for the acid surrogate, 2,4,6-tribromophenol, less than 10% and the quantitation limits for its acid compounds were qualified unusable ("R"). (See FORM-II SV-2 in Appendix F.)

DATA SUMMARY FORM: B N A S 3

Name: HOFFMAN LANDFILL

WATER SAMPLES  
(µg/L)

# 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limits:  
(CROL \* Dilution Factor)

Sample No. Dilution Factor Location		CKY14	CKY15	CKY16	CKY17	CKY18	CKY19	CKY20	CKY21	CKY23
1.0		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
BLK-1		SW1	SW1	SW1	SW3	SW4	SW5	SW6	SW1	SW2
Field Plan				Field Dip of CKY19			Field Dip of CKY16			
CROL	COMPOUND									
10	N-Nitrosodiphenylamine									
10	4-Bromophenyl-phenylether									
10	*Hexachlorobenzene									
25	*Pentachlorophenol									
10	Phenanthrene									
10	Anthracene									
10	Carbazole									
10	Di-n-butylphthalate									
10	Fluoranthene									
10	Pyrene									
10	Butylbenzylphthalate									
10	3,3'-Dichlorobenzidine									
10	Benzo(a)anthracene									
10	Chrysene									
10	bis(2-Ethylhexyl)phthalate	2 B	2 B	1 B	3 B	3 B	2 B	6 B	6 B	3 B
10	Di-n-octylphthalate									
10	Benzo(b)fluoranthene									
10	Benzo(k)fluoranthene									
10	Benzo(a)pyrene									
10	Indeno(1,2,3-cd)pyrene									
10	Dibenz(a,h)anthracene									
10	Benzo(g,h,i)perylene									

CROL = Contract Required Quantitation Limit

**WATER SAMPLES**  
**(µg/L)**

Case #: 18347 Sampling Date(s): 6/22/92

To calculate sample quantitation limit:  
(CRL \* Dilution Factor)

[illegible]

**CRQL = Contract Required Quantitation Limit**

DATA SUMMARY FORM: B N A S 2

Site Name: HOFFMAN LANDELL

WATER SAMPLES

(µg/L)

Case #: 18347 Sampling Date(s): 6/23/92To calculate sample quantitation limits:  
(CRQL \* Dilution Factor)

Sample No. Dilution Factor Location		CKY24	CKY25	CKY26										
		1.0	1.0	1.0										
		SW3	SW4	LTI										
CRQL	COMPOUND													
10	Hexachlorobutadiene													
10	4-Chloro-3-methylphenol													
10	2-Methylnaphthalene													
10	Hexachlorocyclopentadiene													
10	2,4,6-Trichlorophenol													
25	2,4,5-Trichlorophenol													
10	2-Chloronaphthalene													
25	2-Nitroaniline													
10	Dimethylphthalate													
10	Acenaphthylene													
10	2,6-Dinitrotoluene													
25	3-Nitroaniline													
10	Acenaphthene		R	R	R									
25	2,4-Dinitrophenol													
25	4-Nitrophenol													
10	Dibenzofuran													
10	2,4-Dinitrotoluene													
10	Diethylphthalate													
10	4-Chlorophenyl-phenylether													
10	Fluorene													
25	4-Nitroaniline													
25	4,6-Dinitro-2-methylphenol													

ORIGINAL  
RECORD

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: B N A S 3

te Name: HOFFMAN LANDFILL

WATER SAMPLES  
(µg/L)

se #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limit:  
(CRQL \* Dilution Factor)

Sample No. Dilution Factor Location		CKY24 1.0 SW3	CKY25 1.0 SW4	CKY26 1.0 LT1															
CRQL	COMPOUND																		
10	N-Nitrosodiphenylamine																		
10	4-Bromophenyl-phenylether																		
10	*Hexachlorobenzene																		
25	*Pentachlorophenol																		
10	Phenanthrene																		
10	Anthracene																		
10	Carbazole																		
10	Di-n-butylphthalate																		
10	fluoranthene																		
10	Pyrene																		
10	Butylbenzylphthalate																		
10	3,3'-Dichlorobenzidine		VJ		VJ		VJ												
10	Benzo(a)anthracene																		
10	Chrysene																		
10	bis(2-Ethylhexyl)phthalate	3 B	1 B	2 B															
10	Di-n-octylphthalate																		
10	Benzo(b)fluoranthene																		
10	Benzo(k)fluoroanthene																		
10	Benzo(a)pyrene																		
10	Indeno(1,2,3-cd)pyrene																		
10	Dibenz(a,h)anthracene																		
10	Benzo(g,h,i)perylene																		

ROL = Contract Required Quantitation Limit

DATA SUMMARY FORM: B N A S 1

Site Name: HOFFMAN LANDFILLSOIL SAMPLES  
(µg/Kg)Case #: 18347 Sampling Date: 6/23/92To calculate sample quantitation limit:  
(CRQL \* Dilution Factor) / ((1 - % moisture)/100)

Sample No. Dilution Factor % Moisture Location		CKY28	CKY29	CKY30	CKY31	CKY32	CKY33	CKY34	CKY35	CKY36
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		19	17	40	23	18	11	13	3	10
		SFD1	SFD2	SFD3	SFD4	S1	S2	S3	S4	S5
								Field Dup. of CKY38		
CRQL	COMPLAIND									
330	Phenol		UJ			UJ			UJ	UJ
330	bis(2-Chloroethyl)ether									
330	2-Chlorophenol									
330	1,3-Dichlorobenzene									
330	1,4-Dichlorobenzene									
330	1,2-Dichlorobenzene									
330	2-Methylphenol									
330	2,2'-Oxybis(1-chloropropane)									
330	4-Methylphenol			62	UJ	UJ	UJ			
330	N-Nitroso-di-n-propylamine									
330	Hexachloroethane									
330	Nitrobenzene									
330	Isophorone									
330	2-Nitrophenol									
330	2,4-Dimethylphenol									
330	bis(2-Chloroethoxy)methane									
330	2,4-Dichlorophenol									
330	1,2,4-Trichlorobenzene									
330	Naphthalene									
330	4-Chloroaniline		↓			↓		↓	↓	↓

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: B N A S : 2

Site Name: HOFFMAN LANDFILL

**SOIL SAMPLES**  
**(µg/Kg)**

Case #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limit:  
(CROL \* Dilution Factor) / ((100 - % moisture)/100)

		CKY28	CKY29	CKY30	CKY31	CKY32	CKY33	CKY34	CKY35	CKY36
Sample No.		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Dilution Factor		19	17	40	23	18	11	13	3	10
% Moisture		SFD1	SFD2	SFD3	SFD4	S1	S2	S3	S4	S5
Location								Field Dup. of CKY38		
CRQL	COMPOUND									
330	Hexachlorobutadiene	VJ			VJ			VJ	VJ	VJ
330	4-Chloro-3-methylphenol									
330	2-Methylnaphthalene		92 J							
330	Hexachlorocyclopentadiene									
330	2,4,6-Trichlorophenol									
800	2,4,5-Trichlorophenol									
330	2-Chloronaphthalene									
800	2-Nitroaniline									
330	Dimethylphthalate									
330	Acenaphthylene									
330	2,6-Dinitrotoluene									
800	3-Nitroaniline									
330	Acenaphthene									
800	2,4-Dinitrophenol									
800	4-Nitrophenol									
330	Dibenzofuran									
330	2,4-Dinitrotoluene									
330	Diethylphthalate									
330	4-Chlorophenyl phenylether									
330	Fluorene									
800	4-Nitroaniline			VJ		VJ		VJ		
800	4,6-Dinitro-2methylphenol	V			V			V	V	V

**CRQL = Contract Required Quantitation Limit**

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DATA SUMMARY FORM: B N A S 3

Site Name: HOFFMAN LANDFILL

SOIL SAMPLES  
(µg/Kg)

Case #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limit:  
(CRQL \* Dilution Factor) / ((100 - % moisture)/100)

Sample No. Dilution Factor % Moisture Location		CKY28	CKY29	CKY30	CKY31	CKY32	CKY33	CKY34	CKY35	CKY36
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		19	17	40	23	18	11	13	3	10
		SFD1	SFD2	SFD3	SFD4	S1	S2	S2	S4	S5
								Field Dup. of CKY38		
CRQL	COMPOUND									
330	N-Nitrosodiphenylamine		VJ						VJ	VJ
330	4-Bromophenyl-phenylether									
330	Hexachlorobenzene									
800	Pentachlorophenol									
330	Phenanthrene		130 J	56 J					47 J	
330	Anthracene									
330	Carbazole									
330	Di-n-butylphthalate									
330	Fluoranthene		120 J							
330	Pyrene		85 J					39 J		
330	Butylbenzylphthalate		46 B	240 B		180 B	160 B			
330	3,3'-Dichlorobenzidine									
330	Benzo(a)anthracene		110 J							
330	Chrysene		120 J							
330	bis(2-Ethylhexyl)phthalate		93 B							
330	Di-n-octylphthalate						38 B			
330	Benzo(b)fluoranthene		250 J							
330	Benzo(k)fluoranthene		250 J							
330	Benzo(a)pyrene		120 J							
330	Indeno(1,2,3-cd)pyrene		64 J							
330	Dibenz(a,h)anthracene									
330	Benzo(g,h)perylene									

CRQL = Contract Required Quantitation Limit

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DATA SUMMARY FORM: B N A S 1

Site Name: HOFFMAN LANDELL

SOIL SAMPLES

(µg/Kg)

Case #: 18347 Sampling Date: 6/23/92

To calculate sample quantitation limit:  
 (CRQL \* Dilution Factor) / ((1 - % moisture)/100)

Sample No. Dilution Factor % Moisture Location		CK437	CK438																
		1.0	1.0																
		8	12																
		S6	S7																
			Field Dup. of CK434																
CRQL	COMPOUND																		
330	Phenol																		
330	bis(2-Chloroethyl)ether																		
330	2-Chlorophenol																		
330	1,3-Dichlorobenzene																		
330	1,4-Dichlorobenzene																		
330	1,2-Dichlorobenzene																		
330	2-Methylphenol																		
330	2,2'-Oxybis(1-chloropropane)																		
330	4-Methylphenol																		
330	N-Nitroso-di-n-propylamine																		
330	Hexachloroethane																		
330	Nitrobenzene																		
330	Isophorone																		
330	2-Nitrophenol																		
330	2,4-Dimethylphenol																		
330	bis(2-Chloroethoxy)methane																		
330	2,4-Dichlorophenol																		
330	1,2,4-Trichlorobenzene																		
330	Naphthalene																		
330	4-Chloroaniline																		

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

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DATA SUMMARY FORM: B N A S 2

ite Name: HOFFMAN LANDFILL

SOIL SAMPLES  
(µg/Kg)

ase #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limits:  
(CRQL \* Dilution Factor) / ((100 - % moisture)/100)

Sample No. Dilution Factor % Moisture Location		CK437	CK438															
		1.0	1.0															
		8	12															
		S6	S7															
			Field Dp.															
			CK434															
CRQL	COMPOUND																	
330	Hexachlorobutadiene																	
330	4-Chloro-3-methylphenol																	
330	2-Methylnaphthalene																	
330	Hexachlorocyclopentadiene																	
330	2,4,6-Trichlorophenol																	
800	2,4,5-Trichlorophenol																	
330	2-Chloronaphthalene																	
800	2-Nitroaniline																	
330	Dimethylphthalate																	
330	Acenaphthylene																	
330	2,6-Dinitrotoluene																	
800	3-Nitroaniline																	
330	Acenaphthene																	
800	2,4-Dinitrophenol																	
800	4-Nitrophenol																	
330	Dibenzofuran																	
330	2,4-Dinitrotoluene																	
330	Diethylphthalate																	
330	4-Chlorophenyl-phenylether																	
330	Fluorene																	
800	4-Nitroaniline																	
800	4,6-Dinitro-2methylphenol																	

ORIGINAL  
Red

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS  
revised 07/90

DATA SUMMARY FORM: B N A S 3

## SOIL SAMPLES

(µg/Kg)

ite Name: HOFFMAN LANDFILL

ase #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limit:  
 (CRQL \* Dilution Factor) / ((100 - % moisture)/100)

Sample No. Dilution Factor % Moisture Location		CK437	CK438																
		1.0	1.0																
		8	12																
		SG	ST																
			Field Dp																
			of CK434																
CRQL	COMPOUND																		
330	N-Nitrosodiphenylamine																		
330	4-Bromophenyl-phenylether																		
330	Hexachlorobenzene																		
800	Pentachlorophenol																		
330	Phenanthrene																		
330	Anthracene																		
330	Carbazole																		
330	Di-n-butylphthalate																		
330	Fluoranthene																		
330	Pyrene																		
330	Butylbenzylphthalate																		
330	3,3'-Dichlorobenzidine	130	8																
330	Benzo(a)anthracene																		
330	Chrysene																		
330	bis(2-Ethylhexyl)phthalate																		
330	Di-n-octylphthalate																		
330	Benzo(b)fluoranthene																		
330	Benzo(k)fluoranthene																		
330	Benzo(a)pyrene																		
330	Indeno(1,2,3-cd)pyrene																		
330	Dibenz(a,h)anthracene																		
330	Benzo(g,h)perylene																		

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/7/90

TABLE 3  
DATA SUMMARY FORM: INORGANICS

Page 1 of 4

to Name: Hoffman Landfill

WATER SAMPLES  
(µg/L)

to # 18347 Sampling Date(s): 6/23/92

Due to dilution, sample quantitation limit is affected.  
See dilution table for specifics.

Sample No. Dilution Factor Location	MCJY07 1.0 BLK-1 field blank	MCJY08 1.0 GW-1	MCJY09 1.0 GW-2 Duplicate MCJY12	MCJY10 1.0 GW-3	MCJY11 1.0 GW-4	MCJY12 1.0 GW-5 Duplicate MCJY09	MCJY13 1.0 GW-6	MCJY15 1.0 SW-1	MCJY16 1.0 SW-2	MCJY17 1.0 SW-3
ANALYTE										
ALUMINUM		12.1	146	182	112	99.8	197	734	206	
ANTIMONY				7.0			1.4		1.0	
ARSENIC		42.6	137	206	28.7	133	238	52.2	17.3	37.7
BARIUM			0.31 B	2.7		0.29 B			0.24 B	
BERYLLIUM										
CADMIUM										
CALCIUM	9.7 B	24100	70400	83300	139000	69800	21000	22100	117000	11400
CHROMIUM				2.8	2.2					
COBALT				13.2			1.9	4.2	37.8	
COPPER			49.7	271	500	458	8.5	3.9		
IRON	5.6 B	77.6	1030	172000	1530	931	9300	740	5800	3140
LEAD			6.0	35.3	7.5	5.8	1.3	1.5		
MAGNESIUM		6220	17300	19400	22100	17000	11300	5980	44600	4650
MANGANESE		11.1	78.1	577	31.6	66.8	490	126	3020	429
MERCURY										
NICKEL				13.4				17.7	78.7	
POTASSIUM		511	2460	1090	1440	2320	1740	1070	1870	4300
SELENIUM										
SILVER										
SODIUM		3170	3990	13100	1640	4140	4080	5590	12100	1960
THALLIUM										
Vanadium										
ZINC	4.0 B	8.8 B	60.5	561	254	56.3	308	34.4	32.0	7.5 B
CYANIDE										

DL = Contract Required Detection Limit

\*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

TABLE 3  
DATA SUMMARY FORM: INORGANICS

Page 2 of 4

Hoffman Landfill

WATER SAMPLES  
(µg/l.)

18347 Sampling Date(s): 6/23/92

Due to dilution, sample quantitation limit is affected.  
See dilution table for specifics.

Sample No.	MCJY18	MCJY19	MCJY32	MCJY33	MCJY35						
Dilution Factor	1.0	1.0	1.0	1.0	1.0						
Location	SW-4	LT-1	BLK-1	GW-6	GW-DUP						
ANALYTE			filtered MCJY07 fld blank	filtered MCJY13 DUP MCJY35	filtered MCJY13 DUP MCJY33						
Aluminum	378	3530			16.7						
Antimony											
Arsenic		2.7									
Barium	49.1	78.6	1.5	222	222						
Beryllium											
Cadmium											
Calcium	21800	16400	319	20800	20200						
Chromium		5.3									
Cobalt	3.7	8.2			3.2						
Copper		15.2									
Iron	195	12000	12.1	8170	8150						
Lead	0.40	10.7									
Magnesium	5950	2490	47.6	11200	10900						
Manganese	77.9	327	4.3	484	476						
Mercury											
Nickel	11.9	9.9									
Potassium	1090	2520		1690	1600						
Selenium											
Silver											
Sodium	5040	3330	181	3960	3880						
Thallium	ALL	ALL									
Vanadium											
Zinc	25.5	68.0	29.3	35.2	18.1						
Cyanide											

L = Contract Required Detection Limit

\*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 08/92

ORIGINAL  
(Red)

*Attachment II*



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
REGION III  
CENTRAL REGIONAL LABORATORY  
839 BESTGATE ROAD  
ANNAPOLIS, MARYLAND 21401-3013  
(410) 573 - 2799

ORIGINAL  
(Red)

DATE : October 1, 1992  
SUBJECT : Region III Data QA Review

FROM : Cynthia E. Caporale *C. Caporale*  
Region III ESAT RPO (3ES31)

TO : Michael Taurino  
Regional Project Manager (3HW73)

Attached is the inorganic data validation report for the Hoffman Landfill Site (Case 18347) completed by the Region III Environmental Services Assistance Team (ESAT) contractor under the direction of Region III ESD.

If you have any questions regarding this review, please call me.

Attachment

cc: Jennifer Woods, MD DOE  
Edward Kantor, EMSL-LV  
Regional CLP TPO: Stevie Wilding

Region: III Lab Code: ITPA

TID File: 03920420 Task 1516

revised 03/91

Excellence and Purpose in Action -- Environmental Services Division

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Environmental Services Assistance Teams  
Region 3

1419 Forest Drive, Suite 104  
Annapolis, Maryland 21403

DATE: SEPTEMBER 23, 1992

SUBJECT: INORGANIC DATA VALIDATION, CASE 18347  
SITE: HOFFMAN LANDFILL

FROM: DAN Q BENEDIKT *DPB* MAHBOOBEH MECANIC *MM*  
SENIOR OVERSIGHT CHEMIST SENIOR OVERSIGHT CHEMIST

TO: CYNTHIA E. CAPORALE  
ESAT REGIONAL PROJECT OFFICER

THROUGH: DALE S. BOSHART *DSB*  
ESAT TEAM MANAGER

OVERVIEW

The set of samples for Case 18347 contained twelve (12) unfiltered aqueous samples and eleven (11) solid samples, which were analyzed through the Contract Laboratory Program (CLP) Routine Analytical Services (RAS) for total metals and cyanide. Three (3) field-filtered aqueous samples were analyzed through the CLP RAS for dissolved metals. The sample set included both a filtered and non-filtered field blank, and field duplicate pairs for the aqueous, filtered aqueous and solid matrices.

The 35.3  $\mu\text{g/L}$  concentration for the lead (Pb) analyte in aqueous sample MCJY10 exceeded the Chemical Health Advisory Level (EPA Action Level) of 20.0  $\mu\text{g/L}$ .

SUMMARY

The laboratory divided the samples into two (2) Sample Delivery Groups (SDGs), and performed the analyses according to Statement of Work (SOW) ILM02.1. All analytes were successfully analyzed in all samples with the exception of antimony (Sb) in the solid matrix. Issues relating to data usability are discussed in order of importance in the following paragraphs.

TABLE 1B

## CODES USED IN COMMENTS COLUMN

- A = The matrix spike recovery for this analyte was extremely low. The quantitation limits are biased extremely low and may be unusable.
- B = The continuing calibration blank had a result >IDL (the result is in parentheses) and the results in the listed samples were <5x the blank value. The reported results may be biased high.
- C = The preparation blank had a result >IDL (the result is in parentheses) and the results in the listed samples were <5x the blank value. The reported results may be biased high.
- D = The RPD for the laboratory duplicate results exceeded the control limit (the RPD is in parentheses). The results may be estimated.
- E = The analytical spike recovery was low (the range of recoveries is in parentheses). The reported result or quantitation limit may be biased low.
- F = The matrix spike recovery was low (the % recovery is in parentheses). The reported quantitation limits may be biased low.
- G = The field blank had a result >IDL (the result is in parentheses) and the results in the listed samples were <5x the blank value. The reported results may be biased high.
- H = The percent difference in the ICP serial dilution analysis exceeded the control limit (the percent difference is in parentheses). The reported results may be estimated.

TABLE 2

GLOSSARY OF DATA QUALIFIER CODES (INORGANIC)

CODES RELATED TO IDENTIFICATION

(confidence concerning presence or absence of analytes):

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

(NO CODE) = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte Present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

[ ] = Analyte present. As values approach the IDL the quantitation may not be accurate.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

OTHER CODES

Q = No analytical result.

agreed within the laboratory duplicate control limits of 35% RPD or  $\pm 2 \times \text{CRDL}$ . Control limits have not been established for field duplicate analyses and therefore no data have been qualified based on these duplicate results.

The data have been reviewed according to the National Functional Guidelines for Inorganic Data Validation, with modifications for use in Region 3.

#### INFORMATION REGARDING REPORT CONTENT

Table 1A is a summary of qualifiers added to the laboratory's results during evaluation.

#### ATTACHMENTS

TABLE 1A	SUMMARY OF QUALIFIERS ON DATA SUMMARY FORMS AFTER DATA VALIDATION
TABLE 1B	CODES USED IN COMMENTS COLUMN
TABLE 2	GLOSSARY OF DATA QUALIFIER CODES
TABLE 3	DATA SUMMARY FORMS
APPENDIX A	RESULTS REPORTED BY THE LABORATORY (FORM 1s)
APPENDIX B	TPO REPORT
APPENDIX C	SUPPORT DOCUMENTATION

DB209A04.bsc

TABLE 1A

SUMMARY OF QUALIFIERS ON DATA SUMMARY  
AFTER DATA VALIDATION

<u>ANALYTE</u>	<u>SAMPLES AFFECTED</u>	<u>DETECTED VALUES</u>	<u>NON- DETECTED RESULTS</u>	<u>BIAS</u>	<u>COMMENTS*</u>
Sb	All solid samples		R	EXTREMELY LOW	A (19.1%)
Be	NCJY09, MCJY12, MCJY16	B		HIGH	B (0.30 µg/L)
Ca	MCJY07	B		HIGH	C (25.8 µg/L)
Fe	MCJY07	B		HIGH	C (9.7 µg/L)
	MCJY32	B		HIGH	C (9.7 µg/L) D (27.6%)
	MCJY33, MCJY35	J			D (27.6%)
Mg	MCJY32	B		HIGH	C (20.4 µg/L)
Mn	MCJY32, MCJY33, MCJY35	J			D (27.4%)
Se	MCJY10, MCJY24-MCJY31	L	UL	LOW	E (66.0%-84.0%)
Tl	MCJY08-MCJY13, MCJY15- MCJY18		UL	LOW	E (60.5%-84.0%) F (71.2%)
	MCJY07, MCJY19		UL	LOW	F (71.2%)
Zn	MCJY07, MCJY08, MCJY17, B MCJY18			HIGH	C (5.4 µg/L)
	MCJY33, MCJY35	B		HIGH	G (29.3 µg/L)
	All solid samples	J			H (11.5%)

\* See explanation of comments in Table 1B.

**MAJOR PROBLEM**

The recovery for the Sb analyte was very low (< 30%) in the solid matrix spike. Quantitation limits for this analyte may be biased extremely low, and have been qualified unusable, "R", on the Data Summary Form.

**MINOR ISSUES**

A number of analytes were detected in the laboratory continuing calibration blanks (CCBs), preparation blanks (PBs) or field blanks (FBs) at concentrations greater than (>) the Instrument Detection Limit (IDL). Results in samples that are less than (<) five times (5x) the levels detected in the blanks may be biased high, and have been qualified "B" on the Data Summary Forms. The following table lists the analytes affected by blank contamination and the type of blank used to qualify data.

<u>ANALYTE</u>	<u>MATRIX AFFECTED</u>	<u>TYPE OF BLANK USED</u>
Beryllium (Be)	AQ	CCB
Calcium (Ca)	AQ	PB
Iron (Fe)	AQ, FILT.	PB
Magnesium (Mg)	FILT.	PB
Zinc (Zn)	AQ, FILT. FILT.	PB FB

(AQ = non-filtered aqueous, FILT. = filtered aqueous)

The laboratory duplicate results for the filtered aqueous matrix exceeded the control limit [ $\pm$ Contract Required Detection Limit (CRDL), 20% Relative Percent Difference (RPD)] for the Fe and manganese (Mn) analytes. Results for these analytes have been qualified estimated, "J", except where superseded by the previously mentioned "B" qualifier.

The serial dilution result for the solid matrix exceeded the control limit (10% Difference) for the Zn analyte. Results for this analyte have been qualified estimated, "J", on the Data Summary Form.

The analytical spike recovery for the selenium (Se) and/or thallium (Tl) analytes were low (<85%) in some samples. The result or quantitation limit associated with each of these recoveries has been qualified biased

low, "L" or "UL", respectively on the Data Summary Forms.

The matrix spike recovery for the Tl analyte in the non-filtered aqueous matrix spike analysis was also low (<75%). Quantitation limits for this analyte in non-filtered samples may be biased low; those results which have not already been qualified "UL" based on the low analytical spike recoveries, have been qualified "UL" on the Data Summary Forms.

#### NOTES

The laboratory applied the "N" qualifier to the Tl analyte in filtered aqueous samples based on the Tl recovery in the non-filtered matrix spike. The Tl recovery was within control limits in the filtered matrix spike and therefore, they have not been qualified on the Data Summary Forms.

Similarly, the laboratory has applied the "\*" qualifier to the Fe and Mn analytes in non-filtered aqueous samples based on the filtered duplicate analysis. The results for these analytes in the non-filtered duplicate analysis were within control limits and therefore they have not been qualified on the Data Summary Forms.

The laboratory has applied the "W" qualifier to the Tl quantitation limits in samples MCJY25, MCJY27 and MCJY29-MCJY31 because the analytical spike recoveries associated with these analyses exceeded the 115% control limit. The results for these analyses, however, were < IDL and high recoveries do not impact detection capability. Therefore, the analytical spikes were not used to qualify data.

The laboratory has applied the "\*" qualifier to the Al analyte in solid samples because the laboratory duplicate analysis for the Al analyte in that matrix exceeded the contractual control limits ( $\pm$ CRDL, 20% RPD). The laboratory duplicate results, however, did not exceed the usability limits ( $\pm 2 \times$ CRDL, 35% RPD) established for solid samples in Region 3. Therefore, no data have been qualified based on these duplicate results.

Results for non-filtered field duplicate pair MCJY09/MCJY12 and filtered field duplicate pair MCJY33/MCJY35 agreed within the 20% RPD or  $\pm$  CRDL control limits established for laboratory duplicate analyses, while the results for solid field duplicate pair MCJY27/MCJY31

ORIGINAL  
(Red)

Appendix A

Glossary of Data Qualifiers

ORIGINAL  
(Red)

## GLOSSARY OF DATA QUALIFIER CODES (ORGANIC)

### CODES RELATING TO IDENTIFICATION

(confidence concerning presence or absence of compounds)

U = Not detected. The associated number indicates approximate sample concentration necessary to be detected.

NO CODE = Confirmed identification.

B = Not detected substantially above the level reported in laboratory or field blanks.

R = Unreliable result. Analyte may or may not be present in the sample. Supporting data necessary to confirm result.

N = Tentative identification. Consider present. Special methods may be needed to confirm its presence or absence in future sampling efforts.

### CODES RELATED TO QUANTITATION

(can be used for both positive results and sample quantitation limits):

J = Analyte present. Reported value may not be accurate or precise.

K = Analyte present. Reported value may be biased high. Actual value is expected to be lower.

L = Analyte present. Reported value may be biased low. Actual value is expected to be higher.

UJ = Not detected, quantitation limit may be inaccurate or imprecise.

UL = Not detected, quantitation limit is probably higher.

### OTHER CODES

Q = No analytical result.

## DATA SUMMARY FORM: PESTICIDES AND PCB'S

Site Name: HOFFMAN LANDELL

SOIL SAMPLES

(µg/Kg)

Case #: 18347 Sampling Date(s): 6/23/92To calculate sample quantitation limits:  
(CRQL \* Dilution Factor) / ((100 - % moisture)/100)

Sample No. Dilution Factor % Moisture Location		CKY 28	CKY 29	CKY 30	CKY 31	CKY 32	CKY 33	CKY 34	CKY 35	CKY 36
		1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
		19	17	40	23	18	11	13	3	10
		SFD1	SFD2	SFD3	SFD4	S1	S2	S3	S4	S5
								Field Dup of CKY38		
CRQL	COMPOUND									
1.7	alpha-BHC						0.25 J		0.100 J	
1.7	beta-BHC									
1.7	delta-BHC									
1.7	gamma-BHC (Lindane)		0.079 J			0.25 J	0.16 J	0.13 J	0.41 J	0.37 J
1.7	Heptachlor	0.17 J	0.35 J	0.48 J	0.25 J	0.13 J	0.065 J		0.050 J	
1.7	Aldrin						0.65 J	0.58 J		
1.7	Heptachlor Epoxide						0.18 J	0.30 J	0.10 J	
1.7	Endosulfan I						0.13 J	0.40 J	0.30 J	
3.3	Dieldrin		0.072 J			0.20 J				
3.3	4,4'-DDE	0.20 J	0.64 J	0.39 J	0.38 J					0.97 J
3.3	Endrin		0.47 J				0.075 J	0.59 J	0.27 J	0.51 J
3.3	Endosulfan II							0.31 J	0.22 J	
3.3	4,4'-DDD		0.15 J		0.51 J					
3.3	Endosulfan Sulfate						0.096 J			
3.3	4,4'-DDT				0.15 J	0.16 J				1.2 J
17	Methoxychlor		0.32 B		0.92 B		0.39 B	0.46 B	9.4 J	10.99 B
3.3	Endrin Ketone	0.18 J	0.31 J			0.16 J		0.15 J	0.47 J	0.17 J
1.7	alpha-Chlordane		0.36 J					0.55 J	0.39 J	
1.7	gamma-Chlordane		0.46 J		0.16 J	0.072 J	0.41 J	0.67 J	0.41 J	0.45 J
170	Ioxaphene									
33	Aroclor-1016									
67	Aroclor-1221									
33	Aroclor-1232									
33	Aroclor-1242									
33	Aroclor-1248									
33	Aroclor-1254									
33	Aroclor-1260									
3.3	Endrin Alcohol									
CRQL	Contract	Quantitation	Limit					SEE NARRATIVE	FOR CODE	DEFINITIONS

CRQL Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

Site Name: HOFFMAN LANDFILL

## SOIL SAMPLES

Case #: 18347 Sampling Date(s): 6/23/92

(μg/Kg)

To calculate sample quantitation limit:  
(CRQL \* Dilution Factor) / ((100 - % moisture)/100)

Sample No.		CKY37		CKY38											
Dilution Factor		10		10											
% Moisture		8		12											
Location		56		57											
				Field Dyp. of CKY34											
CROL	COMPOUND														
1.7	alpha-BHC														
1.7	beta-BHC														
1.7	delta-BHC														
1.7	gamma-BHC (Lindane)	0.12	J												
1.7	Heptachlor			0.094	J										
1.7	Aldrin			0.33	J										
1.7	Heptachlor Epoxide			0.26	J										
1.7	Endosulfan I			0.24	J										
3.3	Dieldrin			0.33	J										
3.3	4,4'-DDE														
3.3	Endrin			0.56	J										
3.3	Endosulfan II														
3.3	4,4'-DDD			1.3	J										
3.3	Endosulfan Sulfate														
3.3	4,4'-DDT														
17	Methoxychlor			0.67	B										
3.3	Endrin Ketone	0.12	J												
1.7	alpha-Chlordane			0.48	J										
1.7	gamma-Chlordane			0.51	J										
170	Toxaphene														
33	Aroclor-1016														
67	Aroclor-1221														
33	Aroclor-1232														
33	Aroclor-1242														
33	Aroclor-1248														
33	Aroclor-1254														
33	Aroclor-1260														
3.3	Endrin N-hexyle														

ORIGINAL  
(Red)

CRQ#	Contract	Required	Quantitation	Limit
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revised 07/9C

TABLE 3

## DATA SUMMARY FORM: INORGANICS

Name: Hoffman Landfill

## SOIL SAMPLES

# 18347 Sampling Date(s): 6/23/92

(mg/Kg)

+Due to dilution, sample quantitation limit is affected.  
See dilution table for specifics.

Sample No. Dilution Factor % Solids Location	MCJY21		MCJY22		MCJY23		MCJY24		MCJY25		MCJY26		MCJY27		MCJY28		MCJY29		MCJY30	
	1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0		1.0	
	88.3		61.8		70.0		78.8		80.9		88.2		87.9		97.5		87.4		91.2	
	SED-1		SED-2		SED-3		SED-4		S-1		S-2		S-3		S-4		S-5		S-6	
ANALYTE													Duplicate MCJY31							
Aluminum	3750		3750		3660		4260		8270		4270		9470		4670		7900		12000	
Antimony		R		R		R		R		R		R		R		R		R		R
Arsenic	5.2		10.6		2.3		3.6		7.9		3.3		4.5		3.4		3.8		3.6	
Barium	145		54.5		68.9		86.5		142		56.6		126		105		71.9		56.8	
Beryllium	1.4		1.6		0.93		1.7		1.1		0.99		1.3		1.2		0.84		0.93	
Cadmium							0.65		0.42											
Calcium	10000		10400		874		1290		2640		1200		2290		2940		5610		739	
Chromium	10		332		9.0		12.2		12.0		8.9		13.8		10.9		9.6		14.6	
Cobalt	48.1		180		12.8		54.1		19.3		14.6		17.4		22.1		11.3		13.1	
Copper	21.0		13.7		25.7		16.1		28.7		21.1		21.3		21.3		14.1		15.6	
Iron	47100		49700		25100		27900		33900		24000		35900		54700		21900		33800	
Lead	19.9		21.5		18.1		15.7		35.0		17.5		21.2		14.9		21.1		9.7	
Magnesium	582		1140		580		785		1030		784		1030		764		1330		1200	
Manganese	2590		13500		160		1460		1170		311		819		781		620		316	
Mercury													0.19							
Nickel	57.7		169		20.9		89.1		22.2		14.6		16.5		22.0		9.8		12.9	
Potassium	794		632		1370		577		1240		1240		1120		1130		904		949	
Selenium	0.49		1.8		0.41		0.31		0.35				0.31				0.31		0.30	
Silver																				
Sodium	83.0		101		61.7		44.4		119		463		52.0		80.5		174		37.9	
Thallium																				
Vanadium	14.7		13.4		18.4		11.7		18.3		17.2		21.0		15.0		17.6		21.0	
Zinc	140	J	119	J	76.5	J	188	J	78.0	J	79.9	J	110	J	130	J	64.2	J	64.5	J
Cyanide													0.45		0.23					

DL = Contract Required Detection Limit

\*Action Level Exists

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

(mg/Kg)

ORIGIN (Red)

Due to dilution, sample quantitation limit is affected  
See dilution table for specifics

[illegible]

101. = Contract Required Detection Limit

### Action Level Rating

SEE NARRATIVE FOR CODE DEFINITION  
revised 07/

## DATA SUMMARY FORM: VOLATILES 1

Site Name: HOFFMAN LANDFILLSOIL SAMPLES  
(µg/Kg)Case #: 18347 Sampling Date(s): 6/23/92To calculate sample quantitation limit:  
(CRQL \* Dilution factor) / ((100 - % moisture)/100)

Sample No. Dilution Factor % Moisture Location		CKY37		CKY38													
		1.0		1.0													
		8		12													
				Field Dup. of CKY34													
CRQL	COMPOUND																
10	Chloromethane																
10	Bromomethane																
10	Vinyl Chloride																
10	Chloroethane																
10	Methylene Chloride	33	B	98	B												
10	Acetone	21	B	35	B												
10	Carbon Disulfide																
10	1,1-Dichloroethene																
10	1,1-Dichloroethane																
10	Total 1,2-Dichloroethane																
10	Chloroform																
10	1,2-Dichloroethane																
10	2-Butanone																
10	1,1,1-Trichloroethane																
10	Carbon Tetrachloride																
10	Bromodichloromethane																

DATA SUMMARY FORM: VOLATILES 2

Site Name: HOFFMAN LANDFILL

**SOIL SAMPLES**  
**( $\mu\text{g/Kg}$ )**

Case #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limits:  
(CRQL \* Dilution Factor) / ((100 - X moisture)/100)

[illegible]

**CRQL = Contract Required Quantitation Limit**

SEE NARRATIVE FOR CODE DEFINITIONS

revised 10/90

## DATA SUMMARY FORM: VOLATILES 1

Site Name: HOFFMAN LANDEILL

**SOIL SAMPLES**  
( $\mu\text{g/Kg}$ )

Case #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limits:  
(CROL \* Dilution factor) / ((100 - % moisture)/100)

[illegible]

CRQL	Contract	Required	Quantitation	Limit
1	1	1	1	1
2	2	2	2	2
3	3	3	3	3
4	4	4	4	4
5	5	5	5	5
6	6	6	6	6
7	7	7	7	7
8	8	8	8	8
9	9	9	9	9
10	10	10	10	10
11	11	11	11	11
12	12	12	12	12
13	13	13	13	13
14	14	14	14	14
15	15	15	15	15
16	16	16	16	16
17	17	17	17	17
18	18	18	18	18
19	19	19	19	19
20	20	20	20	20
21	21	21	21	21
22	22	22	22	22
23	23	23	23	23
24	24	24	24	24
25	25	25	25	25
26	26	26	26	26
27	27	27	27	27
28	28	28	28	28
29	29	29	29	29
30	30	30	30	30
31	31	31	31	31
32	32	32	32	32
33	33	33	33	33
34	34	34	34	34
35	35	35	35	35
36	36	36	36	36
37	37	37	37	37
38	38	38	38	38
39	39	39	39	39
40	40	40	40	40
41	41	41	41	41
42	42	42	42	42
43	43	43	43	43
44	44	44	44	44
45	45	45	45	45
46	46	46	46	46
47	47	47	47	47
48	48	48	48	48
49	49	49	49	49
50	50	50	50	50
51	51	51	51	51
52	52	52	52	52
53	53	53	53	53
54	54	54	54	54
55	55	55	55	55
56	56	56	56	56
57	57	57	57	57
58	58	58	58	58
59	59	59	59	59
60	60	60	60	60
61	61	61	61	61
62	62	62	62	62
63	63	63	63	63
64	64	64	64	64
65	65	65	65	65
66	66	66	66	66
67	67	67	67	67
68	68	68	68	68
69	69	69	69	69
70	70	70	70	70
71	71	71	71	71
72	72	72	72	72
73	73	73	73	73
74	74	74	74	74
75	75	75	75	75
76	76	76	76	76
77	77	77	77	77
78	78	78	78	78
79	79	79	79	79
80	80	80	80	80
81	81	81	81	81
82	82	82	82	82
83	83	83	83	83
84	84	84	84	84
85	85	85	85	85
86	86	86	86	86
87	87	87	87	87

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/90

## DATA SUMMARY FORM: VOLATILES 2

Site Name: HOFFMAN LANDFILL

**SOIL SAMPLES**  
**( $\mu\text{g/Kg}$ )**

Case #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limit:  
(CROL \* Dilution Factor) / ((100 - % moisture)/100)

[illegible]

CRQL = Contract Required Quantitation Limit

SEE NARRATIVE FOR CODE DEFINITIONS

CONFIDENTIAL 07/90

Site Name: HOFFMAN LANDFILL

## WATER SAMPLES

Case #: 18347 Sampling Date(s): 6/23/92

(μg/L)

To calculate sample quantitation limit:  
(CROL \* Dilution Factor)

[illegible]

CRQL = Contract Required Quantitation Limit

DATA SUMMARY FORM: VOLATILES 2

Site Name: HOFFMAN LANDELL

**WATER SAMPLES**  
( $\mu\text{g/L}$ )

Case #: 18347 Sampling Date(s): 6/23/92

To calculate sample quantitation limit:  
(CRL \* Dilution factor)

[illegible]

CROL	= Contract	Required	Quantitation	Limit	*Action	Level	Exists
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SEE NARRATIVE FOR CODE DEFINITIONS  
revised 07/90

Site Name: HOFFMAN LANDFILL

## WATER SAMPLES

Case #: 12347 Sampling Date(s): 6/23/92

(μg/L)

To calculate sample quantitation limit:  
(CRQL \* Dilution Factor)

[illegible]

**CROL = Contract Required Quantitation Limit**

**\*Action Level Exists**

SEE NARRATIVE FOR CODE DEFINITIONS

revised 07/9

## DATA SUMMARY FORM: VOLATILES 1

Site Name: HOFFMAN LANDFILL

WATER SAMPLES

(µg/L)

Case #: 18347 Sampling Date(s): 6/23/92To calculate sample quantitation limit:  
(CRQL \* Dilution Factor)

Sample No. Dilution Factor Location		CKY14 1.0 BLF1 Field Blank		CKY15 1.0 GW1		CKY16 1.0 GW2 Field Dup. of CKY19		CKY17 1.0 GW3		CKY18 1.0 GW4		CKY19 1.0 GW5 Field Dup. of CKY16		CKY20 1.0 GW6		CKY22 1.0 SW1		CKY23 1.0 SW2	
CRQL	COMPOUND																		
10	Chloromethane				UJ		UJ												
10	Bromomethane																		
10	*Vinyl Chloride																		
10	Chloroethane																		
10	*Methylene Chloride	22	B	1	B	3	B	4	B	6	B	6	B	3	B	5	B	5	B
10	Acetone	15	B			15	B	9	B	12	B	15	B			12	B	12	B
10	Carbon Disulfide																		
10	*1,1-Dichloroethene																		
10	1,1-Dichloroethane																		
10	*Total 1,2-Dichloroethene																		
10	Chloroform					4	J					4	J						
10	*1,2-Dichloroethane																		
10	*2-Butanone																		
10	*1,1,1-Trichloroethane																		
10	*Carbon Tetrachloride																		
10	Bromodichloromethane																		

ORIGINAL  
REF

CRQL = Contract Required Quantitation Limit

### MINOR PROBLEMS

- o The semivolatile extractions of samples CKY28, CKY31, CKY34, CKY35, CKY36 and CKY38 were performed thirteen (13) days and sample CKY29 seventeen (17) days from the date of sample collection. Although no technical holding time for the semivolatile extraction of soil samples has been established, the technical holding time of seven (7) days for the aqueous samples has been exceeded by six (6) and ten (10) days, respectively, in these samples. The aqueous sample holding time was applied and, therefore, the quantitation limits in these samples were qualified "UJ" and positive results were qualified "J", except when superseded by the "B" qualifier in the affected samples. (See Traffic Report in Appendix F.)
- o Several compounds failed precision criteria in the volatile and semivolatile initial and continuing calibrations. The positive results were qualified "J" except when superseded by the "B" qualifier. The quantitation limits were qualified "UJ" when the QC limits were grossly exceeded (%RSD or %D greater than 50%), except for the acid compound 4-nitrophenol in the semivolatile fraction of sample CKY32, where it was superseded by the "R" qualifier. (See Table I in Appendix F.)
- o During the pesticide/PCB analyses, positive results have been flagged "P" on Form I's when the %D between the two columns was greater than 25%. These results were qualified "J" on the data summary forms.

### NOTES

- o During the semivolatile analysis, sample CKY18MSD failed both surrogate and spike recovery criteria due to an extraction error and no reanalysis was performed. No action was taken. (See Case Narrative.)
- o In the semivolatile analyses, aqueous samples CKY16, CKY19 and CKY20 had one (1) and sample CKY18 had two (2) (one acid and one base) surrogate recoveries above the QC limits and soil samples CKY32MS, CKY32MSD and CKY34 had one (1) surrogate recovery below the QC limit, but greater than 10%. No action was taken. (See FORM-II SV-1 and FORM-II SV-2 in Appendix F.)
- o In the pesticide/PCB analyses, aqueous samples CKY14 and CKY26 and soil samples CKY30, CKY32 and CKY36 had one (1) each of their surrogate recoveries below the QC limits but greater than 10%. No action was taken. (See FORM II-PEST in Appendix F.)
- o The maximum concentration of all compounds found in the analyses of the field and laboratory method blanks are listed below. Samples with concentrations of common

laboratory contaminants less than ten times (<10X) the blank concentration or with concentrations of other contaminants less than five times (<5X) the blank concentration, have been qualified "B" on the data summary forms.

<u>COMPOUND</u>	<u>CONCENTRATION</u>
methylene chloride*	30 $\mu\text{g/Kg}$
acetone*	31 $\mu\text{g/Kg}$
phenol	3 J $\mu\text{g/L}$
diethylphthalate*	1 J $\mu\text{g/L}$
butylbenzylphthalate*	6 J $\mu\text{g/L}$
bis(2-ethylhexyl)phthalate*	10 $\mu\text{g/L}$
methoxychlor	0.59 J $\mu\text{g/Kg}$

\* Common Laboratory Contaminant

- o Samples CKY16/CKY19 and CKY34/CKY38 were the field duplicate pairs analyzed in the aqueous and solid samples, respectively. Their results and precision estimates, excluding the blank contaminants, are listed in the table below:

<u>COMPOUND</u>	<u>CONCENTRATION (<math>\mu\text{g/L}</math>)</u>		<u>RPD</u>
	<u>CKY16</u>	<u>CKY19</u>	
chloroform	4 J	4 J	0
	<u>CONCENTRATION (<math>\mu\text{g/Kg}</math>)</u>		
	<u>CKY34</u>	<u>CKY38</u>	
fluoranthene	39 J	61 J	44
pyrene	ND	55 J	IN
benzo(b)fluoranthene	ND	61 J	IN
benzo(a)pyrene	ND	61 J	IN
gamma-BHC	0.13 J	ND	IN
heptachlor	ND	0.094 J	IN
aldrin	0.58 J	0.37 J	44
heptachlor epoxide	0.30 J	0.26 J	14
endosulfan I	0.40 J	0.34 J	16
dieldrin	ND	0.33 J	IN
endrin	0.59 J	0.56 J	5
endosulfan II	0.31 J	ND	IN
4,4'-DDD	ND	1.3 J	IN
endrin ketone	0.15 J	ND	IN
alpha-chlordane	0.55 J	0.48 J	14
gamma-chlordane	0.67 J	0.51 J	27

RPD = Relative Percent Difference

ND = Not Detected

IN = Indeterminate

- Non-spiked compounds other than blank contaminants were detected in the pesticide/PCB analyses of samples CKY18, CKY32 and their matrix spike/matrix spike duplicate recoveries. Their results and precision estimates are as follows:

<u>COMPOUND</u>	<u>CONCENTRATION (<math>\mu\text{g/L}</math>)</u>			<u>%RSD</u>
	<u>CKY18</u>	<u>CKY18MS</u>	<u>CKY18MSD</u>	
endrin ketone	ND	0.0099 J	0.0074 J	24

	<u>CONCENTRATION (<math>\mu\text{g/Kg}</math>)</u>			
	<u>CKY32</u>	<u>CKY32MS</u>	<u>CKY32MSD</u>	
benzo(b)fluoranthene	ND	ND	48 J	IN
benzo(k)fluoranthene	ND	ND	48 J	IN
delta-BHC	ND	0.093 J	0.22 J	81+
heptachlor epoxide	ND	0.21 J	ND	IN
endrin ketone	0.66 J	ND	1.2 J	58+
benzo(b)fluoranthene	ND	ND	48 J	IN
benzo(k)fluoranthene	ND	ND	48 J	IN

%RSD = Percent Relative Standard Deviation

+ = RPD instead of %RSD

ND = Not Detected

IN = indeterminate

- In the semivolatile and pesticide/PCB analyses of soil samples, GPC cleanup was performed. The dilution factor of two (2) required by this procedure was accounted for in the analytical procedures used by the laboratory and, therefore, is not reflected in the data summary forms.
- Sample weights other than thirty (30) grams were used in the semivolatile and pesticide/PCB analyses of several soil samples. The dilution factors on the data summary forms have been changed to reflect this variance, when significant.
- During the semivolatile analyses of samples CKY29 and CKY38 benzo(b/k)fluoranthene isomers coeluted and their results have been flagged "X" on Form I's. (See case narrative in Appendix F.)
- Tentatively Identified Compounds (TIC's) in Appendix D were reviewed and corrected during data validation. Several early eluting TICs were found during the semivolatile analyses due to the use of contaminated methylene chloride. Compounds identified as solvents, laboratory artifacts or blank contaminants were crossed of the TIC Form I's. (See case narrative in Appendix F.)

All data for case 18347 were reviewed in accordance with the Functional Guidelines for Evaluating Organic Analyses with Modifications for use within Region III. The text of this report addresses only those problems affecting usability. ORIGINAL (Red)

Attachments

- 1) Appendix A - Glossary of Data Qualifiers
- 2) Appendix B - Data Summary. These include:
  - (a) All positive results for target compounds with qualifier codes where applicable.
  - (b) All unusable detection limits (qualified "R").
- 3) Appendix C - Results as reported by the Laboratory for all target compounds.
- 4) Appendix D - Reviewed and corrected Tentatively Identified Compounds.
- 5) Appendix E - Organic Regional Data Assessment Summary.
- 6) Appendix F - Support Documentation.

HP029A02.HOF

**4-mile Topographic Map  
Hoffman Landfill  
(MD-4)**

